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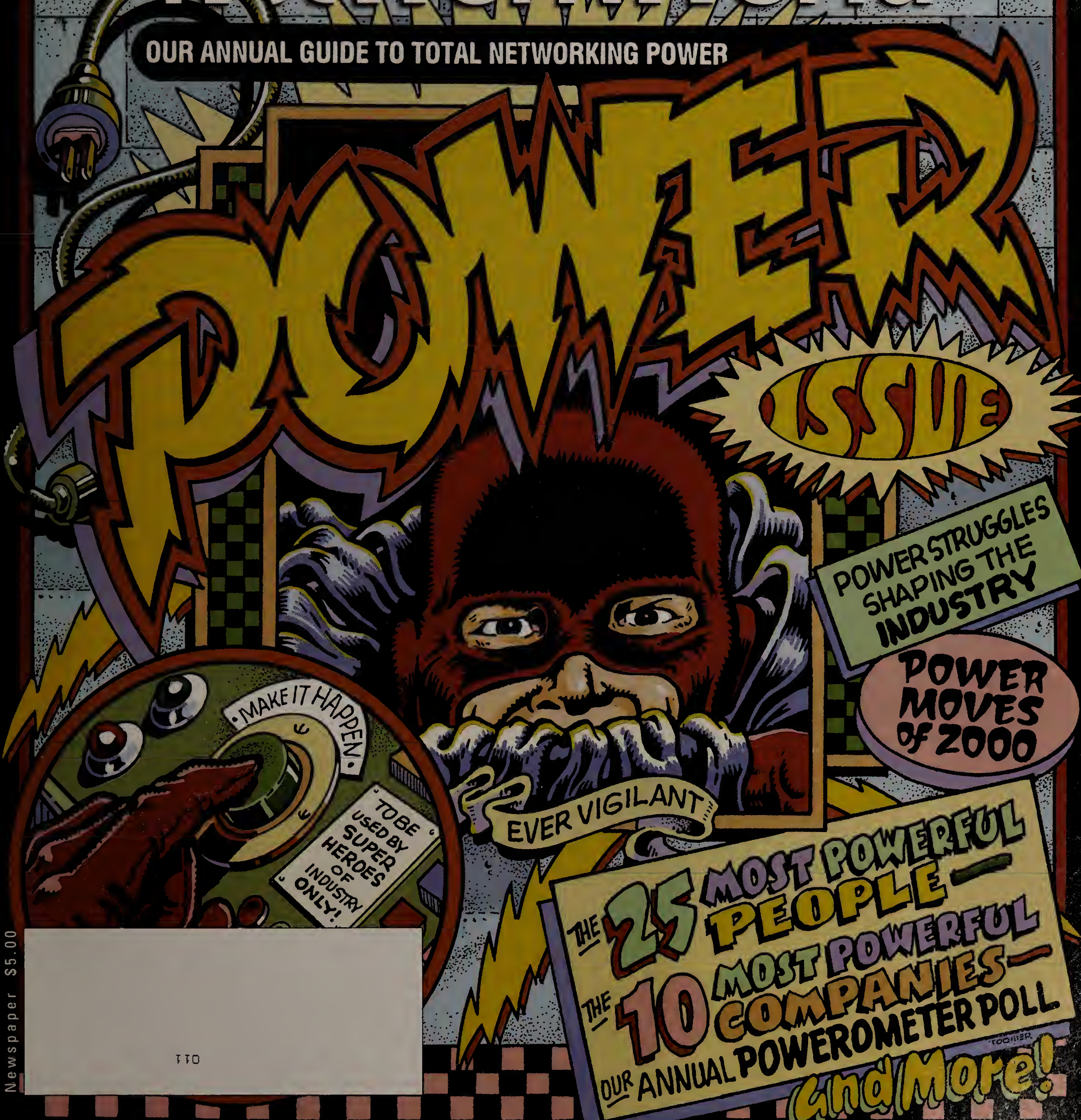
THE Signature SERIES

Volume 18, Number 1

NetworkWorld

OUR ANNUAL GUIDE TO TOTAL NETWORKING POWER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POWER STRUGGLES SHAPING THE INDUSTRY
POWER MOVES OF 2000
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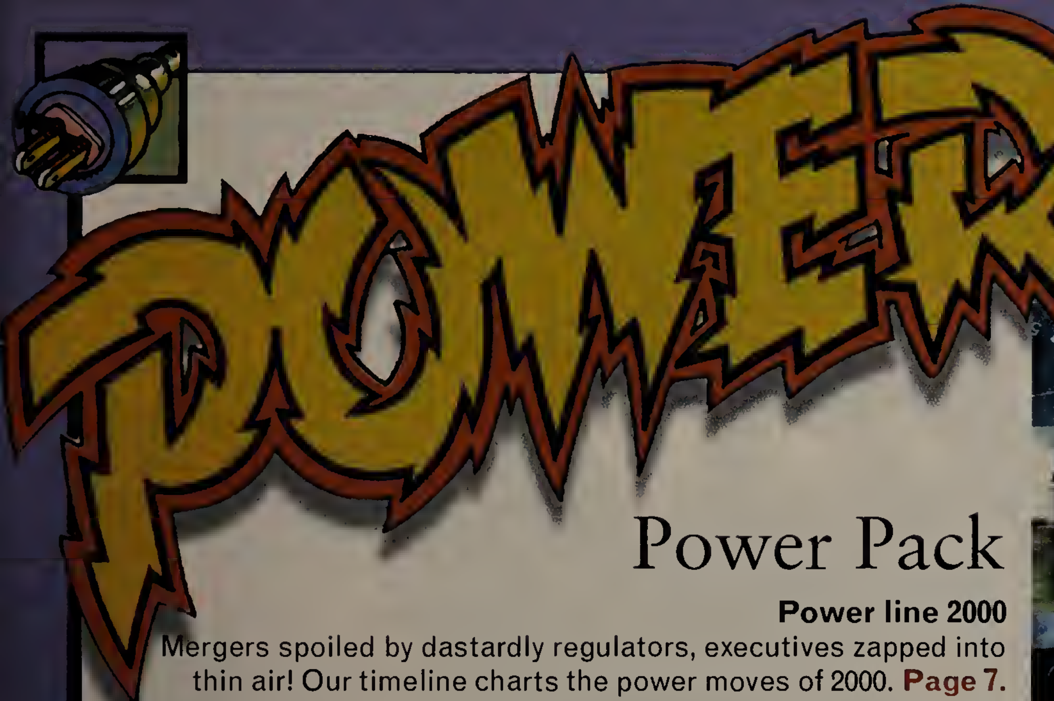


Power Pack

Power line 2000
Mergers spoiled by dastardly regulators, executives zapped into thin air! Our timeline charts the power moves of 2000. Page 7.

10 most powerful companies in networking
Some lord over market segments, others just barely cling to their power. Here's a look at this year's picks. Page 11.

2000 Powerometer: Cisco gains; Microsoft loses
Cisco garners first place in our annual reader poll of the most powerful network companies. Page 22.

Power prognosticator
Six top reporters share their predictions for the year ahead. Page 25.

The power of knowledge
IT needs a big role in identifying and enabling intellectual property. Page 31.

Profiles in Power

25 most powerful people in networking
Here's our annual stab at the 25 network executives who hold the most power, and our cut on 50 others on power's edge. Page 37.

2000 Powerometer: CEO power drain
Chambers is tops in our annual reader poll on CEO power. Page 56.

Power online

Visit our Network World Fusion Power minisite at www.nwfusion.com/power2000/ for another blast of Power. You'll find:

The 2000 Power Line. Check out the corporate, executive and market power plays of the year in this enhanced timeline. Then link to the full stories. **DocFinder: 2325**

The 2000 Interactive Powerometer. Use this tool to compare the Power Ratings of any two or more companies or CEOs ranked in our annual Powerometer poll. **DocFinder: 2327**

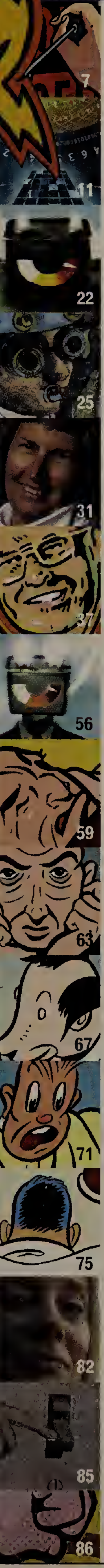
Face-off forum. Go head-to-head with two network managers on whether users should be able to add software or devices to the corporate network. **DocFinder: 2328**

More on the storage-over-IP standards standoff. As part of our storage Power Struggles piece, examine a comprehensive chart listing which vendors support what standards. **DocFinder: 2321**

Expert insight. As a companion to our VoIP Power Struggle feature, IDC Senior Analyst Paul Strauss shares advice on the LAN telephony decision. **DocFinder: 2322**

Plus, head to Network World Fusion throughout the week for breaking news during the holiday season.

Go to www.nwfusion.com.



Power Struggles

10 power struggles shaping the network industry
From corporate politics to standards wrangling, here's a look at issues causing consternation among network executives. Page 59.

Who's running this network anyway?
Mobile devices and multimedia downloads are capturing users attention — and drawing fire from network managers. Page 61.

The DSL decision
DSL competitive local exchange carriers and regional Bell operating companies want your business. What's best for you? Page 63.

The fight for fiber and copper
Tables turn as SBC Communications argues for new technology and CLECs for old. Page 65.

Controlling voice
An IP PBX or a voice-over-IP gateway? Making sense of voice over IP. Page 67.

The management morass
The framework vs. point products decision remains a burden. Page 69.

Stuck in directory limbo
Understanding directory services begins with Microsoft's Active Directory and Novell's eDirectory, but runs far deeper. Page 71.

Big bandwidth vs. QoS
Throw bandwidth at the network or add quality-of-service mechanisms? The debate seems to be fading. Page 73.

Linux against the odds
Linux has gained some heavy backers, but still hasn't broken the enterprise. Will it ever? Page 75.

Storage standoff
Vendors joust over storage-over-IP standards. Page 77.

The apps race
Sun and Microsoft are bitter rivals in the distributed network applications market. What are their latest strategic moves? Page 79.

Face-off: Should users be allowed to add whatever they want to the network?
Two network managers square off on the issue. Page 81.

Personal Power

Power at the negotiating table
The trick is knowing how to handle negotiations from the start. Page 82.

You're going down
10 surefire ways to lose power. Page 85.

Signature Sign-off: Power within reach
Network World Editorial Director John Gallant: Power is yours. Page 86.

THE SIGNATURE SERIES
The Power Issue is one of six bimonthly supplements providing insights, opinions and information on the biggest trends shaping the networked world. Look for our guide to conducting e-commerce in the next Signature Series installment, the Electronic Commerce Issue, coming Feb. 26.

Cover illustration by George Toomer

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BY BETH SCHULTZ

Powerline 2000

See the timeline on the next two pages.

Mergers spoiled by dastardly regulators, **executives zapped** into thin air!

Even **X-ray** vision wouldn't have prepared us for the **power spikes and outages** of 2000.

Overcharged by executive ousters and corporate overhauls, the network industry's power has been put to the test lately. Some market segments have been on fire and others have gone up in smoke. We've seen power surges, power leaks and total power meltdowns.

On the next two pages, we chart the major events that shaped 2000. The power plays in and out of executive offices, in corporate boardrooms and in the market. We've traced the history of the doomed WorldCom-Sprint merger, the trail leading to Rich McGinn's eviction from Lucent, and the passage of key legislation.

For tragic tales, look to entries on the competitive local exchange carriers (CLEC), especially those pertaining to once-shining star Covad Communications. The company began 2000 full of bravado, from an extraordinary 1,148% revenue growth in 1999 and 10% share — larger than any other CLEC — in the DSL market. But trouble began midway through 2000, and by the third quarter earnings were so abysmal that CEO Bob Knowling resigned, and the company trimmed its workforce by 13% and halted construction of a third operations center. As November closed, Covad stock fell to an all-time low of $1.81 per share, down from a 52-week high of $66.63.

Of course, power fluctuation in the service provider market was not limited to CLECs. Telecom giants AT&T and WorldCom ran into their own power shortages — of the earnings variety — that led to their respective dissections. Blame a stagnant voice market, they say. But top that off with acquisition and integration problems. Such bobbles aren't enough to knock AT&T and WorldCom from their places among the mightiest network companies, but, as our grid shows, no future is certain in this electrifying industry.

For joyful news, go no farther than the traditional big powermongers Cisco and Microsoft. Both companies started and ended 2000 on high notes, despite some setbacks. For Cisco, those setbacks included key executive leave-takings and significant encroachment in the WAN router market by upstart Juniper Networks. For Microsoft, it was the dire antitrust ruling handed down by U.S. District Judge Thomas Penfield Jackson. Respective CEOs John Chambers and Steve Ballmer remain as gung-ho as ever, and revenue and stocks as buoyant, too.

So sit back and reminisce while you can. The power plays are already being formulated for 2001.

ILLUSTRATION GEORGE TOOMER

POWER LINE

JAN. 1

Following a year of high-tech hand-wringing over possible Y2K-caused calamities, New Year's day is ushered in peacefully.

JAN. 10

AOL and Time Warner announce their $350 billion merger plan.

JAN. 13

Bill Gates hands his CEO title over to Steve Ballmer and takes on the title of chief software architect.

JAN. 19

Cisco grabs privately held Altiga Networks and Compatible Systems, VPN equipment vendors, in its first acquisitions of 2000.

JAN. 26

Sprint sells interest in Global One to France Telecom and Deutsche Telekom for $1.13 billion.

Sun unveils Solaris 8 operating system with much fanfare; announces early March shipping target.

MARCH 1

Lucent says it will spin off its enterprise network division.

MARCH 7

VeriSign announces intent to acquire Network Solutions in a $21 billion stock deal.

MARCH 8

IBM, i2 Technologies and Ariba ally on e-commerce.

MARCH 13

TeraBeam Networks unveils technology for zapping data through the air at gigabits-per-second speeds for last-mile broadband service.

CLEC Cogent Communications unveils $1,000-per-month offer for 100M bit/sec Internet access.

MARCH 16

Qwest Communications sells off its business in 14 Western states, clearing the way for US West merger but scotching national enterprise contracts.

MARCH 20

3Com exits high-end enterprise gear market.

MARCH 29

Cisco acquires SightPath, a content delivery vendor, for approximately $800 million in stock.

MAY 2

AT&T Wireless IPO raises $10.6 billion; separately, AT&T lowers earnings estimates, ushers in uncertainty about its well-being.

MAY 4

The "LoveLetter" computer virus cripples e-mail systems worldwide.

MAY 5

The Navy conducts the U.S. government's first online "reverse auction" to buy equipment.

Cisco snaps up Web switch maker ArrowPoint Communications in a $5.7 billion stock deal.

MAY 11

The House extends the Internet tax moratorium until 2006.

MAY 18

Boo.com is the first high-profile dot.com failure; begins layoff trend.

MAY 23

Novell releases dismal second-quarter financials, reorganizes.

MAY 24

Oracle ships Oracle 11i.

JANUARY FEBRUARY MARCH APRIL MAY JUNE

FEB. 2

Mario Mazzola, the Cisco senior vice president who had overseen the enterprise network business since 1997, departs. High-profile executives Judy Estrin, Selby Wellman and Don Listwin also leave over the next few months.

Linux gets backing from IBM, Sun and other big vendors at LinuxWorld Expo.

FEB. 7-8

Massive distributed denial-of-service attacks shut down Amazon.com, CNN.com, eBay, E-Trade, Yahoo and others.

FEB. 8

3Com, Cisco, Nortel Networks, Sun and others form the 10 Gigabit Ethernet Alliance to promote the use of 10G Ethernet and drive support for a standard.

Marc Andreessen emerges as founder and chairman of Loudcloud, a start-up offering infrastructure outsourcing.

FEB. 11

Cabletron splits into four companies.

FEB. 17

Microsoft launches Windows 2000.

FEB. 21

Cisco unveils FlexWAN module for Cat 6500, further overlapping the switch with traditional router functions.

FEB. 23

Alcatel buys Newbridge Networks for $7.1 billion in stock.

APRIL 3

Federal Judge Thomas Penfield Jackson finds Microsoft guilty of antitrust violations.

Nasdaq starts tanking, dropping 14% in four hours before bouncing back. Internet stock corrections begin.

APRIL 5

AT&T, British Telecom and Concert Communications announce plans to spend $2 billion over the next three years to build 44 data centers around the world.

APRIL 21

The first online privacy bill in the U.S., called the Children's Online Privacy Protection Act, goes into effect.

JUNE 7

Judge Jackson rules that Microsoft sh
split. Microsoft appeals.

JUNE 15

AT&T, MediaOne close on $44 billion r

JUNE 16

FCC OKs Bell Atlantic-GTE merger, p
for birth of Verizon.

JUNE 19

Nortel unveils plan for marrying optica
mobile wireless technologies.

JUNE 22

Microsoft outlines its .Net strategy for
Windows into a distributed computing
for the 'Net.

JUNE 23

AOL, Time Warner shareholders appro

JUNE 27

Justice Department rejects WorldCom-Sprint merger.

JUNE 30

SBC Communications gets long-distance nod in Texas.

Qwest completes US West merger.

Digital signatures bill becomes law.

Oracle President and Chief Operating
cer Ray Lane resigns.

SPOT ILLUSTRATIONS CHRISTOPH HITZ PHOTOS AOL/TIME WARNER PHOTO BY AP KATHY WILLENS. JUDY ESTRIN PHOTO BY JASON GROW. LARRY ELLISON PHOTO BY AP/MICHAEL SCHMELLING. BOB KNOWLING PHOTO BY DAVID LEE WAITE. RICH MCGINN PHOTO BY STEVE BORNS

JULY 3

Showcase 3Com user Widener University switches to Nortel in wake of 3Com's exit from the high-end enterprise market.

JULY 13

WorldCom, Sprint call off merger.

JULY 27

3Com completes Palm spinoff.

Symantec says it will buy Axent Technologies in a $975 million stock swap; the merged company will be one of the world's largest security vendors.

JULY 28

Nortel acquires Web switch maker Alteon WebSystems for $7.8 billion.

Intel and SAP America close their three-year-old venture Pandesic for hosted e-commerce applications. They cite a lack of profit.

Napster gets reprieve on court order to shut down; case highlights copyright issues for online music.

JULY 31

Microsoft releases Service Pack 1 for Windows 2000. Users have been saying they would wait for this service pack before deploying the software.

SEPT. 5

WorldCom buys Intermedia Communications for $6 billion; gets control of ISP Digex.

SEPT. 6

Novell pink slips 900 workers, 16% of its employee base.

SEPT. 7

Qwest lays off 11,000 workers.

SEPT. 14

Paul Maritz, 14-year Microsoft veteran, resigns.

SEPT. 26

Microsoft offers Windows 2000 DataCenter, its answer to Unix dominance in big data centers.

SEPT. 28

Exodus buys Global Crossing's Web hosting business for $6.1 billion.

After 10 years as 3Com CEO, Eric Benhamou announces he will step down at year-end.

Novell rolls out Portal Services, tangible proof of its "one Net" concept unveiled in March.

SEPT. 29

E-comm giants Amazon.com, eBay, Charles Schwab and others join forces in a consortium to fight the distributed denial-of-service threat.

NOV. 1

WorldCom separates core data services from consumer services; it will issue publicly traded tracking stocks for each unit.

Bob Knowling, CEO of once high-flying CLEC Covad Communications, resigns on the heels of a poor quarterly showing. Layoffs follow at month's end.

NOV. 6

Cisco posts 11th consecutive quarter of revenue growth.

NOV. 14

ICG Communications files for Chapter 11, marking more turmoil in the CLEC industry.

NOV. 16

ICANN at last picks new top-level domains: .aero, .biz, .coop, .info, .museum, .name, .pro.

NOV. 17

Oracle Executive Vice President Gary Bloom resigns.

AT&T picks David Dorman, longtime telecom executive, as president.

NOV. 30

Verizon bags planned NorthPoint merger, citing the CLEC's deteriorating financials.

JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

AUG. 3

In shake-up of struggling optical business, Lucent ousts veteran Harry Bosco.

AUG. 8

Verizon announces merger with NorthPoint Communications, signaling increasing difficulty of data CLECs to stand alone.

AUG. 14

Novell ends silence on NetWare; lays out development plans for its flagship network operating system.

AUG. 28

Cisco, Network Appliance and service providers launch the Content Alliance to advance content delivery services.

OCT. 4

Oracle CEO Larry Ellison challenges Web site operators: Replace their IBM or Microsoft Web software with Oracle's 9i Internet Application Server and the 8i database and see performance triple, or Oracle will pay them $1 million.

OCT. 10

Microsoft releases Exchange 2000.

ICANN hosts largest online election ever for five at-large members.

OCT. 11

European Commission conditionally approves AOL-Time Warner merger.

OCT. 12

FCC bans exclusive carrier contracts with office buildings, throwing CLECs a bone against building owners and Bells.

Ariba, IBM and Microsoft say the first implementation of their planned Universal Description, Discovery and Integration business-to-business standard is ready.

OCT. 23

In the face of a dire profit warning, Lucent's board ousts CEO Rich McGinn.

OCT. 25

AT&T's board breaks the company into four units.

DEC. 5

Nasdaq posts its highest-ever one-day gain, jumping 10.5% or 274.05 points. Big high-tech winners were Cisco (up 13.64%) and Sun (up 16.32%).

Dell rolls out new servers for enterprise shops, vowing to overtake Compaq's lead in that market.

DEC. 14

The Federal Trade Commission OKs the AOL-Time Warner merger.

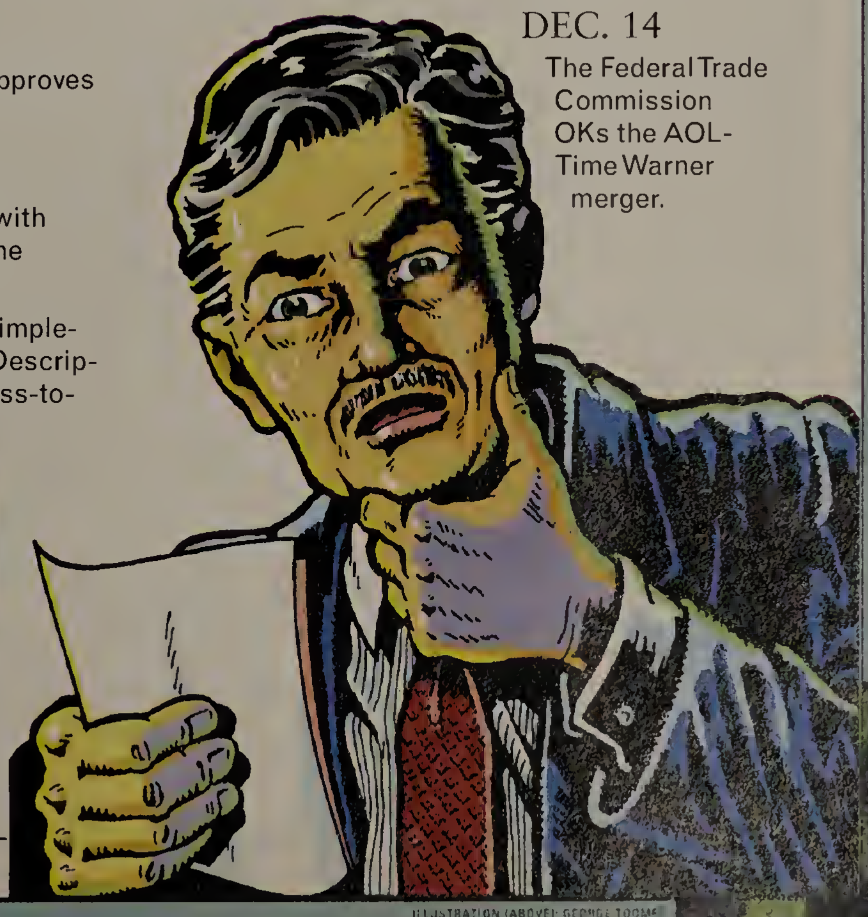

ILLUSTRATION (ABOVE): GEORGE TOOMS

Power in motion

Head **online** for an interactive version of this year's power timeline. Go to www.nwfusion.com, **DocFinder: 2325**

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BY NETWORK WORLD STAFF

10 most powerful companies in networking

Some **lord** over market segments, others just barely **cling** to their power. Here's a look at this year's picks.

Identifying power is not as easy as looking at revenue and market share. Indeed, those are big factors, but we asked *Network World* staff, analysts, enterprise users and other industry watchers who voted on the 10 most powerful companies in networking to consider wider criteria. These include participation in standards bodies, customer service, support and leadership.

This year, EMC, Oracle and SBC Communications (in a tight race against Verizon) made it onto the list, favored for their respective pushes into enterprise storage, e-business applications and business services. Gone are Dell, Compaq, Intel and the beleaguered Novell. Powerful they may still be, but the stage lights have moved elsewhere.

Perennial favorites AT&T, Cisco, IBM, Microsoft, Nortel Networks, Sun and WorldCom ranked high again. This, despite major hurdles for many in 2001.

See **10 Companies**, page 12

10 Companies, continued from page 11

Infrastructure vendors

Cisco

Cisco continues its remarkable pace by outgrowing the entire industry in its three key market segments: service provider, enterprise and "commercial" — small to midsize enterprise — markets. Indeed, the strongest thing Cisco did this year was continue its flawless execution while forcing rivals to retreat from long-held markets, most notably the enterprise segment.

Highlights of 2000 include the $5.7 billion acquisition of ArrowPoint Communications for Web and content switching; an 8,000-seat voice-over-IP network installation in New Zealand; and double-digit sequential growth in the enterprise market, with a couple of quarters exceeding 20%. This growth is truly remarkable given Cisco's chief enterprise competitors are either exiting, ignoring or de-emphasizing this market, or restructuring to win back market share.

Also, Cisco now has 12 product families that are at or above the $1 billion annual booking run rate. Revenue for fiscal 2000, which ended July 29, was $18.9 billion, compared with $12.2 billion for fiscal 1999, an increase of 55%.

It projects revenue growth for fiscal 2001 in the 50% to 60% range, or tallying between $28.4 billion and $30.3 billion.

But Cisco faces major challenges, and pundits say the company cannot keep up its sterling performance for much longer. Cisco's day of reckoning may be fast approaching, they say.

The first challenge is in protecting its router share in the service provider market. Juniper Networks has almost one-third of the WAN router market, nearly double its share a year ago. This has come at the expense of Cisco, which saw its share slide from slightly more than 80% a year ago to less than 70% in the third quarter of 2000.

The second challenge is in attaining the No. 1 or No. 2 position in new markets, predominantly optical and wireless. Nortel Networks is the preeminent supplier of optical network gear to service providers, and the company seems likely to retain the top spot while holding off hungry rivals — Cisco included. Cisco also faces the Nortel obstacle in wireless.

The third challenge is Cisco's growth. The company acquires 20 to 25 smaller companies per year, sometimes splurging billions on bigger ones. Some industry watchers say Cisco may end up buckling under that weight, losing the intellectual talent it acquires and suffering in innovation.

EMC

Storage is hot, so much so that market research firm Robert Frances Group predicts that 70% of IT investment dollars will be spent on storage this year. A good chunk of that money is going to storage powerhouse EMC, which market research firm Dataquest says captured 35% of the overall storage market with its Celerra, Clariion and Symmetrix products.

According to financial reports, EMC is indeed on fire. Storage revenue grew to $2.14 billion in the third quarter of 2000, up 47% compared with the same period a year ago. That marks EMC's highest rate of storage revenue growth in five years, the company says. Enterprise storage software revenue grew at 61% year over year, while year-to-year growth was around 40% for enterprise storage system and midrange storage revenues.

Overall consolidated revenue for the third quarter reached $2.28 billion, up 34% over the same period in 1999. At press time, its stock traded at a 52-week low of $44.75 and a high of $104.94 before settling in the $80 range.

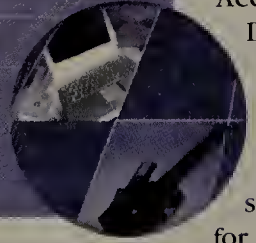
In 2000, the company consummated a series of crafty acquisitions and partnerships that will garner it a place in the growing optical network and network-attached storage (NAS) markets. EMC acquired NAS operating system vendor CrosStor, partnered with Cisco, Lucent and Nortel Networks in the optical network market, and spun off McData, its Fibre Channel switching company.

The CrosStor acquisition is crucial to EMC's bid to dethrone rival Network Appliance from its midrange NAS stronghold. Vendors such as Auspex and Hewlett-Packard use the CrosStor operating system in a variety of NAS appliances. Just weeks ago, EMC announced it will integrate CrosStor into its new IP4700 NAS device.

INFRASTRUCTURE VENDORS

The players:	**Cisco, EMC, IBM, Nortel Networks, Sun**
The goods:	**Routers, servers, switches and storage systems for enterprise and carrier networks.**
Combined revenue*:	**$125.1 billion**
Combined market cap (as of Dec. 14):	**$911.8 billion**

* Fiscal year 2000 or latest nine-month results.



EMC's participation in the standards process can't be ignored, either. The company works with vendors of Fibre Channel-over-IP technology to bridge its storage arrays over distance and is participating in the standards effort to send data natively over IP. EMC's own Fibre Alliance, while criticized by observers for its single-purpose goal of testing interoperability between Symmetrix arrays and other storage-area network/NAS hardware, counts 50 storage companies as members.

Going forward, EMC's biggest challenge is penetrating the midsize storage market while maintaining its strength in large-scale enterprise storage. Its Symmetrix series of storage products is holding its own in large companies; it must now attack the midrange space where Compaq StorageWorks products prevail.

IBM

IBM spent a considerable amount of time and effort in 2000 continuing its e-business conversion. Highlights of this include branding all servers under a new eServer umbrella and the launch of a new server line aimed at Internet business users. It also added the Linux operating system as a preloaded option on its computer systems, running the gamut from entry-level PC servers to huge mainframes.

Connecting the Web to those old mainframe hosts represents a big chunk of IBM's e-business opportunity. With the Web-to-host market growing rapidly — from $240 million in 1999 to $1.5 billion by 2004, according to market research firm IDC — it behooves IBM to maintain its market lead. As such, IBM collapsed several host-access packages into Web-to-host software suites that could save users tens of thousands of dollars.

Elsewhere in e-business, IBM Global Services forged a $450 million agreement to buy collocation services from AT&T. The agreement lets IBM scale its network of 13 Web-hosting centers quicker than an internal build-out would have allowed. By the end of the third quarter of 2001, IBM will be providing Web-hosting services from nine AT&T data centers.

Another of IBM's major e-business undertakings comes through an e-marketplace alliance it forged with Ariba and i2 Technologies. Since their March teaming, the companies have accomplished baseline interoperability among Ariba's B2B Commerce Platform, i2's TradeMatrix software and IBM's hardware and middleware. The IBM products include WebSphere Business-to-Business Integrator, DB2 Universal Database and Tivoli e-Marketplace Manager. The trio will continue working together through the year.

Also in 2000, IBM devoted considerable resources to e-commerce-related standards development. It has helped develop the Web Services Description Language, expected to be the standard for Internet publishing; the Simple Object Access Protocol, for binding; and the Universal Description, Discovery and Integration protocol, expected to be the standard for finding goods on the Internet.

While e-business has knocked some companies off their game, IBM is faring well under its strategy. In line with analyst projections, revenue for the third quarter 2000, which ended Sept. 30, was up 3% during the same period in 1999, to $21.8 billion. IBM anticipates fourth quarter revenue to reach $26.6 billion, or $1.48 per diluted share. The company says revenue per share should reach $4.45 for the whole of 2000.

Nortel Networks

In 2000, Nortel solidified its No. 1 position in optical networking. To do so, the company plunked down almost $5 billion to acquire two optical companies, Xros and CoreTek, and it invested $1.9 billion to more than double the production capacity for its optical components and optical Internet systems production business. Nortel expects more than $10 billion in optical sales in 2000.

Some other strong moves came in the content network and voice-over-IP arenas. In response to Cisco's $5.7 billion acquisition of ArrowPoint Communications, Nortel laid out $7.8 billion for Alteon WebSystems, the market leader in Gigabit Ethernet Web switches. This instantly gives Nortel the top spot in this burgeoning market.

In voice over IP, Nortel closed a $1.4 billion deal with Cable & Wireless to manage the build-out and operation of the Cable & Wireless voice-over-IP network. It will be the largest implementation of Nortel's Succession voice-over-IP product line.

Nortel is also moving aggressively in wireless. In 2000, the company announced the "Wings of Light" initiative to marry its optical networking prowess

See **10 Companies,** page 14

Only one web filtering software has passed through the approval process of 200 Fortune 500 companies.

NASDAQ: WBSN

Deploying Internet filtering may not be your choice. But picking the software is. Why not pick the same one that thousands of other IT professionals have? One that already reduces temptation for over 6 million employees. Its network impact is minimal. Administration is next to nothing. It scales to any size organization. And it's already integrated with leading Internet infrastructure companies like Cisco, Check Point and many others. Sure makes a hard choice an easy one.

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EMPLOYEE INTERNET MANAGEMENT

CISCO SYSTEMS

CHECK POINT™
Software Technologies Ltd.

CacheFlow

Inktomi™

Download FREE 30 Day Trial

Need more proof, just visit our Web site and take a test drive at www.websense.com.

10 Companies, continued from page 12

with mobile wireless technology. Wings of Light includes an alliance with Hewlett-Packard to develop wireless Internet access products and create mobile e-services, as well as software to maintain users' Internet connections as they roam.

Nortel plans to be the No. 2 vendor in wireless in 2001, predominantly in Third-Generation wireless, which is optimized for data.

Another hallmark of 2000 was Nortel's acquisition of Sonoma Systems, an integrated access device maker. The bold $540 million acquisition bolsters the managed services products portfolio Nortel offers to its service provider customers.

Yet, significant challenges are ahead for the telecom equipment giant. Nortel has virtually no carrier-class IP offerings, despite spending $7 billion two years ago for Bay Networks. Nortel killed its Versalar 25000 Internet core router and will instead resell Juniper Networks' WAN routers.

The company plans to integrate IP routing into its OPTera Packet Core IP/optical switch, which is expected to debut in 2001.

The enterprise market continues to lag for Nortel as well. Enterprise is stuck in the single-digit growth range each quarter, while optical, wireless and WAN switching grow in the high double digits. What little growth Nortel gets out of the enterprise comes from the company's customer relationship management application software offerings, not from its data network infrastructure portfolio, which it also obtained from Bay Networks.

Some analysts say a shake-up is in the offing for Nortel's enterprise group to reignite growth.

Sun

The Internet has been extraordinarily good to Sun. Its servers, outfitted with its scalable processor architecture (SPARC) microprocessors and Solaris operating system, are powering many of the biggest Internet commerce sites and service provider networks. Numerous enterprise users have selected Java as the basis for developing server-based Internet commerce applications.

The numbers tell part of the story. Revenue for fiscal year 2000, which ended June 30, was $15.7 billion, up 34% over fiscal 1999 revenue of $11.7 billion. Sun says it expects revenue growth to be in the 35% range for the current fiscal year. But revenue for the quarter ended Sept. 30 ran nearly double that, up 60% from a year ago. That easily beat analysts' expectations yet again. Brokerage house A.G. Edwards had expected a 44% growth rate.

From a product perspective, Sun is on a roll. In September, it released an enhanced version of Solaris 8 and unveiled the first low-end servers using the enhanced operating system on the long-delayed, powerful SPARC III processor.

In 2001, Sun will be rolling out high-end SPARC III servers aimed at big business-to-business e-commerce sites and service providers.

Sun is also pushing Java into the handheld device space, with the aim of turning these devices into programmable computers. On Oct. 30, the Third Generation Partnership Project, which is defining the specification for wireless nets, selected the Java 2 Micro Edition (J2ME) specification as the basis for wireless handset applications. Companies such as Motorola, Nokia, NTT DoCoMo, Sprint PCS, Research in Motion and other handset builders and wireless net providers are using J2ME.

On the downside, the widening shakeout in Internet commerce and dot-com companies could halt capital spending for big, pricey computer systems by key Sun customer targets: application service providers, ISPs and telephone companies.

Additionally, the open source Linux operating system poses a threat to Sun at the low end. Sun addressed this issue in September by acquiring start-up Cobalt Networks, a vendor of Linux-based "appliance" servers aimed at large Web farms and similar sites, in a $2 billion stock-swap deal.

The Cobalt servers will be a separate product line and in the low-end market will cannibalize at least some Solaris sales.

In addition, Sun will have to make the Cobalt business profitable. The company was running in the red but was expected to hit black in early 2001, according to A.G. Edwards.

Enterprise applications vendors

Microsoft

Perennial powerhouse Microsoft kept swinging in 2000, despite getting hit with a few good punches.

The greatest blow came in June, when U.S. District Court Judge Thomas Penfield Jackson found Microsoft guilty of antitrust violations and ordered the company split in two. The appeals process, which will drag through the first half of 2001, could prove to be a power drain.

The stock market got in another shot, with Microsoft's stock price plummeting. At one point in October, the stock price was more than 50% below its yearly high of $119.

Another whammy came with the resignation of 14-year company veteran Paul Maritz, group vice president of the platforms strategy and developer group. He helped develop Windows and Office.

But Microsoft doesn't retract; it reloads.

Steve Ballmer, CEO since January, and Bill Gates, as chief software architect, spent the year hawking Windows 2000 and morphing Windows into a distributed computing infrastructure called .Net. Their challenge now is defining .Net clearly and delivering servers and development tools.

The two delivered big revenue for fiscal year 2000, which ended June 30. The tally was $23 billion, an increase of $3.2 billion over last year. However, that reflects a slight weakening in revenue growth — the 1999 revenue figure came in at $4.5 billion more than the '98 number.

The good news is the stock slide should reverse as Win 2000 finds acceptance; as of early December, the stock was trading in the upper $50 range. Investment forecaster Zacks Investment Research predicts earnings growth of slightly more than 10% for 2001 and 12% for 2002.

Clearly, Microsoft is still a power broker. But just as clear is that the company will have to work harder in 2001 as its bread-and-butter PC market declines.

That means .Net will have to gain traction, and success is needed in new technology areas such as wireless, with the Stinger phone; digital devices, with Pocket PC; and games, with Xbox.

Oracle

Oracle wants desperately to be the main source of software infrastructure for the Internet. It kicked those plans into gear in 2000 and will now accelerate them.

So far, revenue is growing modestly at the software company, although investors clearly believe Oracle is in a good position for bigger gains.

Its market capitalization has soared from $38 billion in 1999 to more than $200 billion in 2000, during a period when revenue grew modestly. Revenue for fiscal 2000, which ended May 31, was $10.1 billion, up nearly 15% from $8.8 billion in 1999.

Oracle projects an overall growth rate for fiscal 2001 revenue in the same area. It expects database revenue to grow 15% to 25%. It's pinning a lot of hope on its suite of Web-enabled enterprise business applications, estimating revenue growth in the 50% to 100% range.

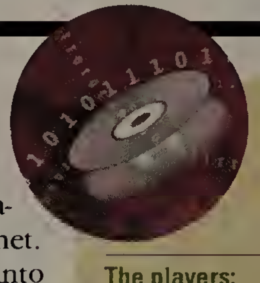
The applications are tightly integrated with each other and with the Oracle database. Integration is key to Oracle's infrastructure marketing campaign.

The companion 9i Oracle Application Server incorporates the Apache Web server and is designed to blend tightly with the database. In mid-2000, Oracle unveiled a database-based caching system for the application to speed e-commerce sites. The Internet File System, released in May, gives users a Windows-like graphical user interface for storing and managing all kinds of files in the database.

But Microsoft's high-end Windows 2000 Datacenter Server release, coupled with the gradual rollout in 2001 of key elements of its .Net Web infrastructure, pose a major threat in the still-evolving world of Web commerce.

Oracle may find it harder to meet that threat with the loss of two executives in 2000. Long-time president Ray Lane, widely respected in the industry, resigned abruptly in early summer. And veteran Executive Vice President Gary Bloom, seen by many as a possible successor to Lane, left in the fall.

See **10 Companies,** page 16



ENTERPRISE APPLICATIONS VENDORS

The players:	Microsoft and Oracle
The goods:	Enterprise resource planning and server application software.
Combined revenue*:	$33.1 billion
Combined market cap (as of Dec. 14):	$477.6 billion

* Fiscal year 2000 results.

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The service providers

10 Companies, continued from page 14

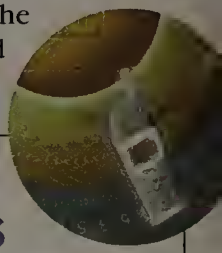
AT&T

No one ever said maintaining power was easy. AT&T, inarguably a telecommunications powerhouse despite recent troubles, knows that all too well. It is fighting an uphill battle to retain its position as the market leader for long-distance and business data services. It must change or die.

AT&T is trying to adapt to the reality that the majority of its revenue will no longer come from consumer voice. While it will derive 60% to 65% of 2000 revenue from voice services, that figure is expected to plummet in the wake of increased competition from local carriers stealing away the business and driving down prices. Voice revenue is going to drop to 50% by the end of 2001 and to 35% or lower by the end of 2002, AT&T estimates.

AT&T's voice struggle, compounded by slower-than-expected growth in business service revenue and difficulty getting its cable business in order, culminated in a restructuring plan announced in late October, following dismal third-quarter results. For that quarter, AT&T reported a 10.9% decline in consumer voice business compared with the same quarter in 1999. While AT&T's overall revenue is still growing, the company's third-quarter revenue of $17 billion compared with the same quarter last year shows only an additional $1 billion in revenue.

Under the restructuring plan, AT&T is divided into four companies: AT&T Business, AT&T Broadband, AT&T Consumer and AT&T Wireless. It's too soon to tell how successful the new AT&T will be, but so far Wall Street hasn't been receptive. The company's stock started falling almost immediately after the restructuring announcement, hitting a low of $18 per share in late November compared with $61 per share in March. At the time of the restructuring, AT&T's market valuation was down $70 billion since January.



SERVICE PROVIDERS

The players:	**AT&T, SBC Communications, WorldCom**
The goods:	**Voice and data services.**
Combined revenue*:	**$117.8 billion**
Combined market cap (as of Dec. 14):	**$315.6 billion**

*Latest nine-month results.

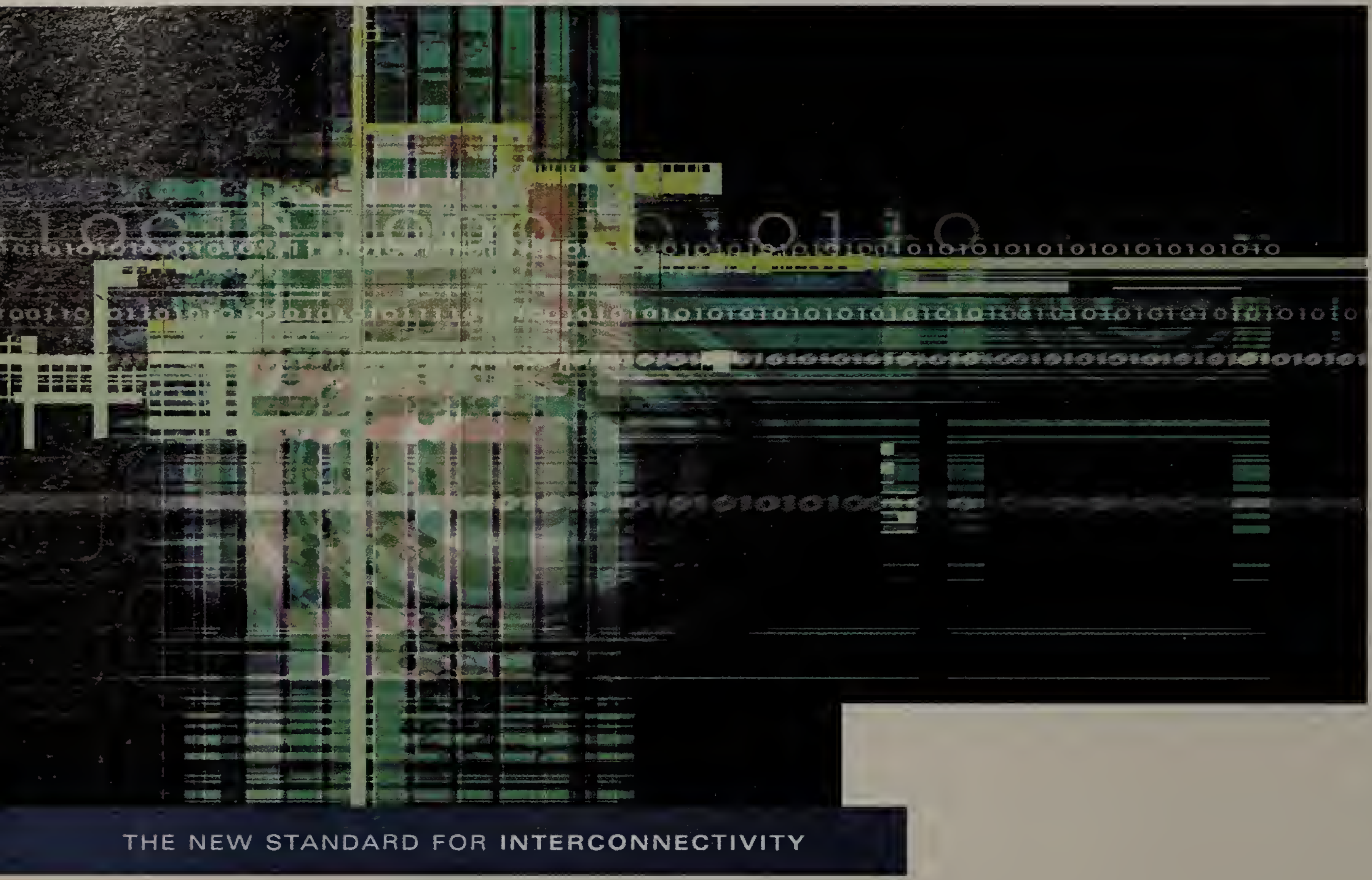
When AT&T wasn't busy reinventing itself, it worked on its Concert joint venture with British Telecom, issuing a trading stock for its AT&T Wireless division in April and signing on customers for its Integrated Network Connect Services. In 2001, it will focus on winning over business customers with innovative new services. On tap are IP VPN services that support public-key infrastructure and span AT&T's access networks.

Behemoths typically don't move quickly or gracefully. AT&T's restructuring better be anything but typical if it expects to keep its networking power.

SBC Communications

SBC Communications is perhaps best known for its appetite for acquisitions. Since the telecommunications act was passed in 1996, SBC has gobbled up several competitors including SNET, Cellular

See **10 Companies,** page 18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10 Companies, continued from page 16

One and fellow regional Bell operating companies Ameritech and Pacific Bell. In 2000, SBC consolidated those acquisitions and launch a variety of services.

SBC's highest profile initiative is Project Pronto, a three-year, $6 billion undertaking to replace residential copper subloops with fiber feeders. Pending regulatory approval, SBC will use residential gateways, smaller than central offices, to roll out DSL services to a broader audience than reachable via the existing copper plant (see story, page 65). Through Pronto, SBC also will install a core ATM network for voice and data services.

Meantime, SBC is proceeding aggressively on other fronts. This year, it began offering long-distance services in Texas; set up switches in Boston, Miami and Seattle to operate as an out-of-region competitive local exchange carrier; and joined with BellSouth to form Cingular, a joint wireless venture that will serve 19 million customers, second only to Verizon's 24 million wireless subscribers.

SBC currently provisions approximately 61 million lines in 13 states and has a market capitalization of more than $192 billion. The company provides local service in California, Illinois, parts of New York and Texas — all revenue-rich territories. Revenue for the third quarter 2000, which ended Sept. 30, was up 8% over the same period in 1999, to $13.5 billion. Revenue is tracking to top $50 billion for fiscal year 2000, and CEO Ed Whitacre is forecasting double-digit revenue growth for 2001.

SBC's biggest challenge in the year ahead will be to ensure it offers adequate service quality in all its regions — particularly those in former Ameritech territory. The FCC and public utility commissions in the former Ameritech states have expressed concerns that SBC is not serving the region adequately.

WorldCom

While WorldCom maintains its position as the second largest carrier in the U.S., the company is suffering the burdens of a big merger gone bad and a declining voice market.

The time WorldCom spent in 2000 trying to get approval for its fruitless merger with Sprint has cost the carrier. Services development played second fiddle to regulatory and negotiation strategies. As a result, WorldCom is behind in the key areas of integrated access service, data center build-out and Web hosting.

Compounded by the same voice revenue decline ripping AT&T inside out, WorldCom was forced to take drastic measures. In November, WorldCom split into business and consumer services units, and issued a tracking stock for the latter (MCI).

Voice revenue for WorldCom was down 3% in third quarter 2000, which ended Sept. 30, compared with the same quarter in 1999. CEO Bernie Ebbers told financial analysts to expect only 12% to 15% revenue growth for WorldCom for the fourth quarter, with little to no growth on the MCI side.

Some analysts say WorldCom's restructuring plan was a sign of desperation, but WorldCom has some strong assets. UUNET, WorldCom's Internet subsidiary, is the company's crown jewel. In the third quarter, it posted the highest revenue growth of all WorldCom sub-

See **10 Companies,** page 21

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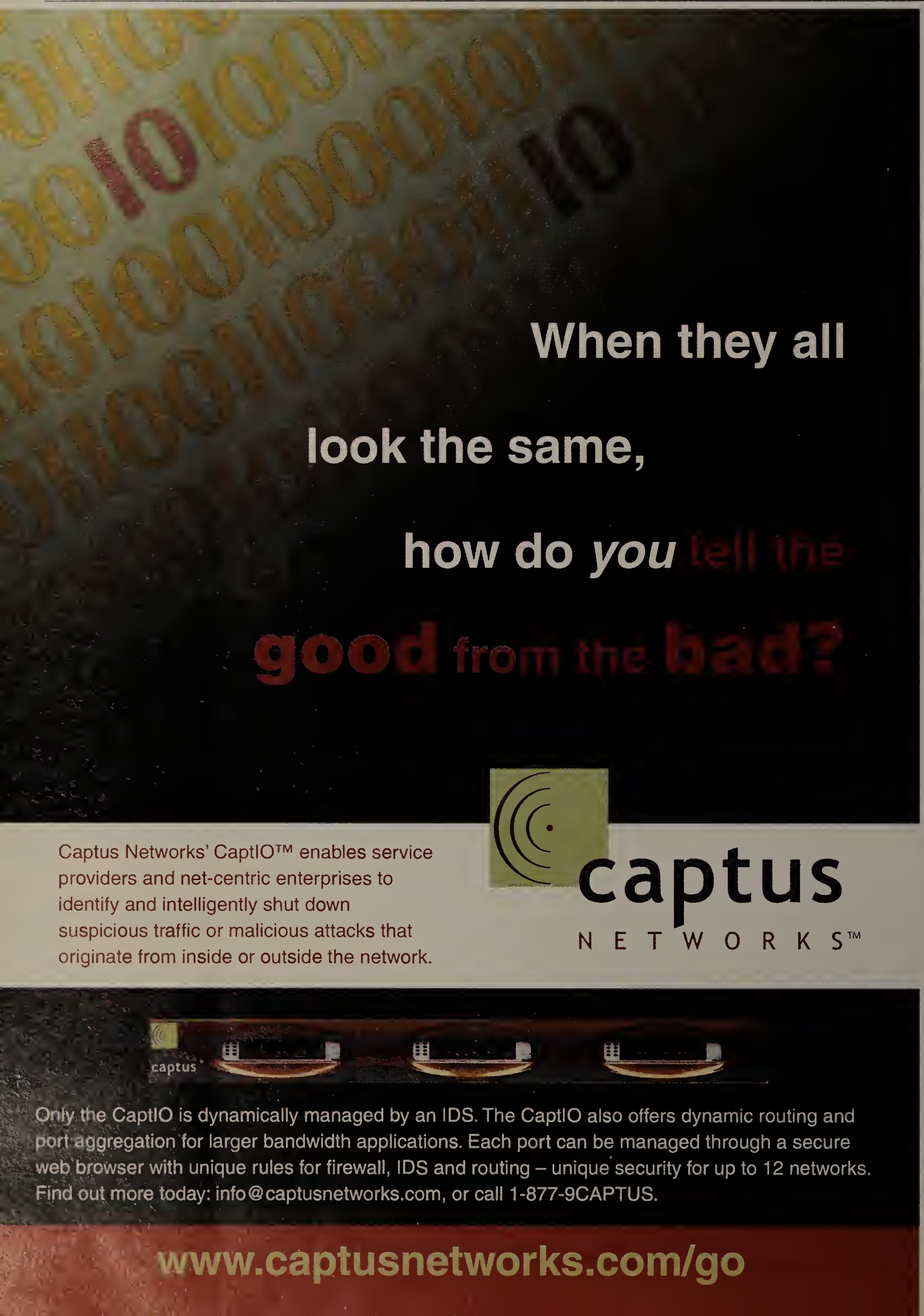
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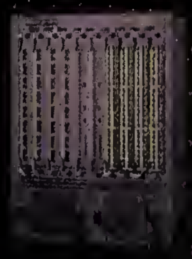

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10 Companies, continued from page 18

sidiaries — up 51% over third-quarter 1999. But UUNET is not enough to sustain WorldCom. The company is in the process of acquiring Intermedia to gain control of Web hosting company Digex, known for its focus on managed services for large and midsize businesses. The $6 billion deal should close early in 2001.

Buying companies to fill in product holes may not be an option for WorldCom any longer, as its stock value crashes. In November, WorldCom's stock plummeted to $16 per share, down from a high of $52 per share in July.

Keeping its No. 2 spot will require WorldCom to integrate Digex's business quickly and painlessly, and to roll out integrated access services for business users.

Deni Connor, John Cox, Jim Duffy, John Fontana, Denise Pappalardo, Michael Martin and Beth Schultz contributed to this report.

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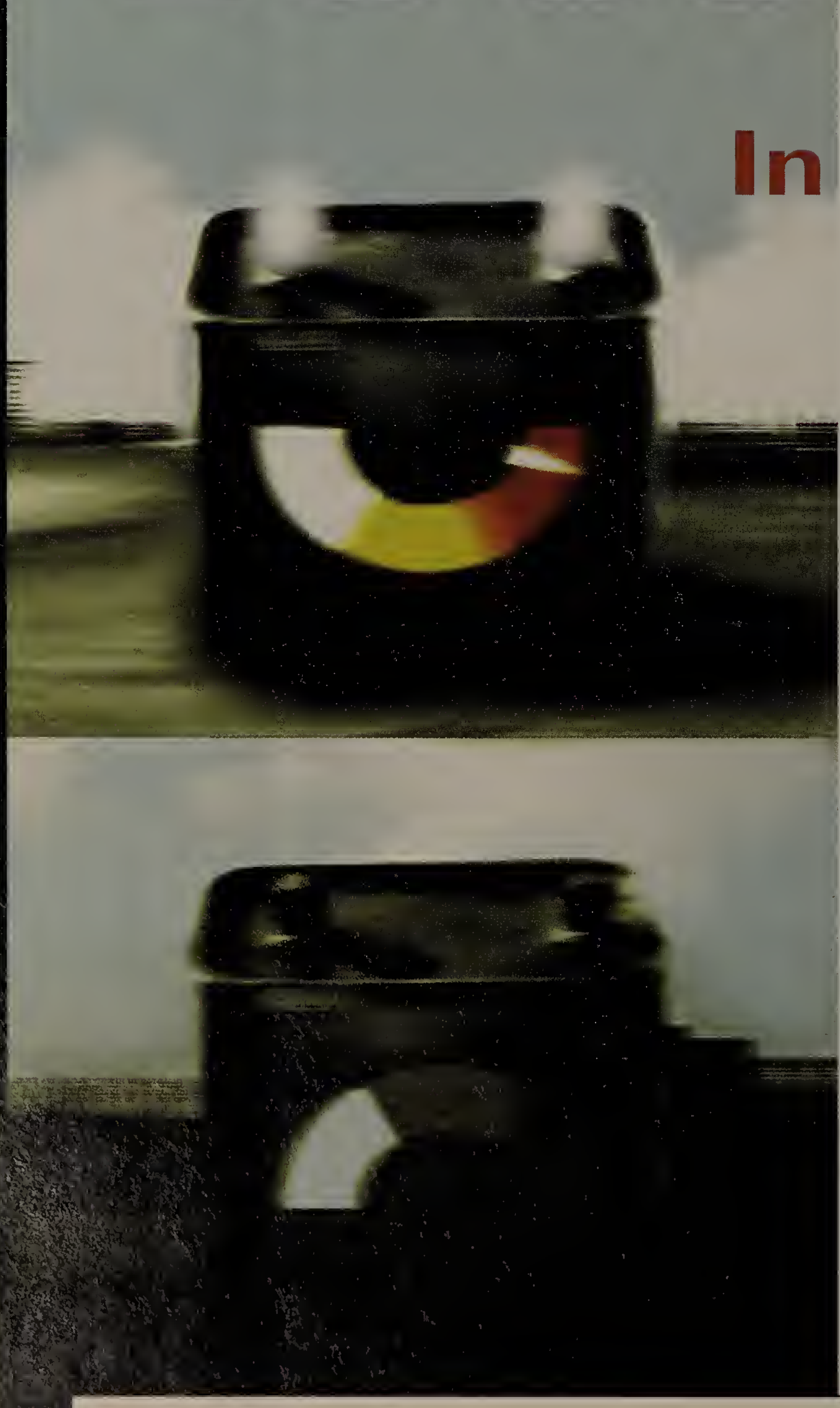
BY JULIE BORT

Cisco's gain is Microsoft's loss

Cisco grabs **first place** in our annual reader poll of most powerful network companies.



In the power-grabbing battle between hardware and network operating system, hardware has finally won. For the first time, Cisco crested our annual company Powerometer list, pushing Microsoft down to No. 2 and ending its four-year reign in the top spot.

So finds our fifth annual Powerometer survey, in which we asked 250 *Network World* readers to rate the power of 25 vendors on a scale from 1 to 100, with 100 representing most power. Research firm Research Concepts conducted the survey for us.

Cisco rose not just in rank, but in every indicator we used to measure power. Its Power Rating rose almost two percentage points, to 81.5 in 2000 from 80.2 in 1999. Three-quarters of respondents expect Cisco's power will continue to increase in 2001.

Meanwhile, Microsoft's Power Rating dropped more than four percentage points this year, to 77.5 from 80.9 in 1999. Far fewer folks — about half — think Microsoft's power will grow in the year to come.

Of the 25 companies on the list, only two others made marked progress in the rankings: Oracle and SBC Communications. Oracle rose seven spots to the No. 4 place, with a Power Rating of 68.5 compared to 66.9 in 1999. Plus, it's looking at the upswing of a bell curve, respondents believe. About half said Oracle's power will rise further in 2001. This growth has come from Oracle's expansion into application services, mobile commerce and IP-based call centers, for example.

SBC climbed nine spots to No. 14, with an 18.6% gain in its Power Rating. The rating hit 59.3, compared to 50 in 1999. However, a closer look finds respondents less than confident about SBC's long-term dominance. More than one-half said they didn't know if SBC would gain or lose power in 2001. This, despite the fact that it continues to storm the wireless and DSL markets, having invested $6 billion in the latter through its Project Pronto.

Dell put in a respectable showing for its entry onto the list: No. 7. Servers, storage-area networks, wireless and partnerships hammer home the fact that the company isn't just PCs anymore. Indeed, it is gaining ground in networking, with more than half of respondents expecting Dell's power to increase in 2001.

The poll, which closed three weeks prior to WorldCom's announced restructuring, predicted problems. WorldCom's Power Rating sunk 10.3% to 60.2 from 67.1 in 1999.

Other companies fared far worse, though: Novell, BellSouth, Lucent and 3Com. No company got more grief than Novell, which plunged in every question asked. Its rank dropped 11 spots from 13 to 24; respondents sliced its Power Rating by almost one-third to 47.4, from 62.3 in 1999. Nearly two-thirds of respondents said they thought the company lost power in 2000, and more than one-half expect it to continue to bleed away its influence in 2001. The company's products simply aren't selling like they used to.

Uncertainty remains over BellSouth as one after another regional Bell operating company is picked off in mergers. BellSouth dropped six places from 16 to 22. Its Power Rating decreased 14.6%, to 50.3, from 58.9 in 1999.

Our poll ended three weeks prior to the ousting of Lucent CEO Rich McGinn, but respondents knew the company was doing poorly anyway. Lucent dropped four spots to the No. 9 rank. Its nearly 10 percentage-point drop in the Power Ratings, to 64.1, landed it on our list of biggest losers.

The two other newcomers fared worse than Dell. SAP and Alcatel landed 20 and 23, respectively. Despite SAP's push into business-to-business e-commerce, its numerous partnerships and its willingness to battle against Oracle and Microsoft, readers feel the company has a long road ahead. Alcatel invited itself onto the list by purchasing Newbridge Networks, 1999's last place company. In that respect, Alcatel gained some footage, climbing over beleaguered Novell and last-place Cabletron. ◪

MOST POWERFUL COMPANIES

We asked 250 *Network World* readers to rate the companies on a power scale of 1 to 100, with 100 being the most powerful. The Power Rating is the mean of reader responses.

Rank	Company	2000 Power Rating	1999 Power Rating	Change	1999 Rank
1	Cisco	81.5	80.2	1.6%	2
2	Microsoft	77.5	80.9	4.2%	1
3	Intel	74.6	75.9	1.7%	3
4	Oracle	68.5	66.9	2.4%	11
5	Sun	67.2	70.6	4.8%	6
6	AT&T	65.1	71.0	8.3%	4
7	Dell*	64.5	N/A	N/A	N/A
8	IBM	64.3	70.5	8.8%	7
9	Lucent	64.1	70.8	9.5%	5
10	Nortel Networks	63.2	62.6	1.0%	12
11	Hewlett-Packard	63.0	67.6	6.8%	9
12	3Com	62.6	67.7	7.5%	8
13	WorldCom	60.2	67.1	10.3%	10
14	SBC	59.3	50.0	18.6%	23
15	Sprint	57.1	59.4	3.9%	15
16	Network Associates	56.2	60.7	7.4%	14
17	Compaq	56.0	57.6	2.8%	18
18	Verizon**	54.2	N/A	N/A	N/A
19	Qwest	54.2	51.5	5.2%	21
20	SAP*	53.1	N/A	N/A	N/A
21	Computer Associates	51.2	56.4	9.2%	19
22	BellSouth	50.3	58.9	14.6%	16
23	Alcatel*	48.7	N/A	N/A	N/A
24	Novell	47.4	62.3	23.9%	13
25	Cabletron	44.7	50.8	12.0%	22

* Not on last year's list.

** The merger of Bell Atlantic and GTE, each of which were listed last year.

POWER WINNERS

Respondents indicated that only 25 Powerometer companies gained power in 2000.

	2000 Index	1999 Index	Gain	2000 Powerometer Rank	1999 Powerometer Rank
SBC	59.3	50.0	18.6%	14	23
Qwest	54.2	51.5	5.2%	19	21
Oracle	68.5	66.9	2.4%	4	11
Cisco	81.5	80.2	1.6%	1	2
Nortel Networks	63.2	62.6	1.0%	10	12

POWER LOSERS

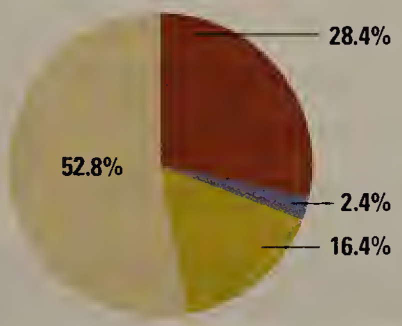
Respondents said roughly two-thirds of the 25 Powerometer companies lost power in 2000.

	2000 Power Rating	1999 Power Rating	Loss	2000 Powerometer Rank	1999 Powerometer Rank
Novell	47.4	62.3	-23.9%	24	13
BellSouth	50.3	58.9	-14.6%	22	16
Cabletron	44.7	50.8	-12.0%	25	22
WorldCom	60.2	67.1	-10.3%	13	10
Lucent	64.1	70.8	-9.5%	9	5
Computer Associates	51.2	56.4	-9.2%	21	19
IBM	64.3	70.5	-8.8%	8	7
AT&T	65.1	71.0	-8.3%	6	4
3Com	62.6	67.7	-7.5%	12	8
Network Associates	56.2	60.7	-7.4%	16	14
Hewlett-Packard	63.0	67.6	-6.8%	11	9
Sun	67.2	70.6	-4.8%	5	6
Microsoft	77.5	80.9	-4.2%	2	1
Sprint	57.1	59.4	-3.9%	15	15
Compaq	56.0	57.6	-2.8%	17	18
Intel	74.6	75.9	-1.7%	3	3

We asked respondents how they thought various companies would fare in 2001.

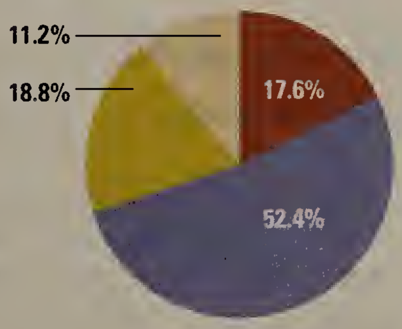
SBC up in the air

More than half of respondents weren't sure whether SBC's power would increase in 2001.



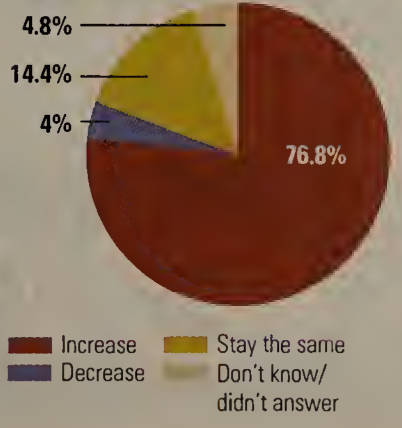
Novell in the doldrums

More than half of respondents don't think Novell will have a good 2001.



Cisco, up and up

More than three-quarters of respondents see Cisco's power on the rise in 2001.



POWER PREDICTIONS

We asked respondents which companies would see a rise in power in 2001, and which would see their power fizzle.

Power on the rise

Percentage of respondents that see the company's power:

	Increasing	Decreasing	Staying the same	Don't know/ didn't answer
Intel	57.2%	10.0%	27.2%	5.6%
Dell	52.45%	6.8%	34.4%	6.4%
Microsoft	51.6%	18.4%	27.6%	2.4%
Oracle	50.8%	6.4%	26.8%	16.0%
Verizon	50.4%	5.2%	14.8%	29.6%
Lucent	49.6%	7.2%	28.4%	14.8%

Power on the decline

Percentage of respondents that see the company's power decreasing.

3Com	25.6%
Compaq	19.2%
Cabletron	18.4%
Microsoft	18.4%

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Kevin Torf, Chairman and Founder
Tornado Development Inc.

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B1200

1. What is the principal business activity at your location?

(check ONE only)

01. ☐ Manufacturing (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable/Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities/Process Industries/Mining, Construction, Petroleum, Refining, Agriculture, Forestry
10. ☐ Education
11. ☐ Government/Military/Aerospace
12. ☐ Consulting (Independent) *
13. ☐ Communications Carriers
14. ☐ ISP
15. ☐ ASP
16. ☐ Manufacturing (Computer/Communications/OEM)
17. ☐ Resellers/VARs/VADs/Integrators/Distributors* (Computers/Communications)*
18. ☐ Other (please specify) ____________

*Attn Consultants, Integrators, Distributors, Resellers: Please complete form based on ALL clients and your own business needs

2. P: What is your primary job function? (check ONE only) S: What is your secondary job function? (check ALL that apply)

P S
☐ 1. ☐ Network Management
☐ 2. ☐ LAN Management
☐ 3. ☐ Datacom/Telecom Management
☐ 4. ☐ CIO/CTO/IS/IT/MIS/Systems Management
☐ 5. ☐ Internet/Intranet/E-Commerce Management
☐ 6. ☐ Engineering Management
☐ 7. ☐ Corporate Management (CEO, COO, CFO, Pres., VP, Dir., Mgr.)
☐ 8. ☐ Consultant (Independent)
☐ 9. ☐ Other (please specify) ____________

3. What is the estimated value of Network equipment and services that you specify, recommend, or approve the purchase of?

(Please print the appropriate number code on the line next to each product category. Please complete ALL categories A–O.)

1. $100 Million or more
2. $50 Million to $99.9 Million
3. $25 Million to $49.9 Million
4. $10 Million to $24.9 Million
5. $1 Million to $9.9 Million
6. $100,000 to $999,999
7. $50,000 to $99,999
8. Under $50,000
9. None of the above

A ____ Large Systems *(Mainframes/Minis)*
B ____ Desktops *(Micros/Laptops/ Workstations)*
C ____ Mobile *(including PDAs, Wireless)*
D ____ Servers
E ____ LANs
F ____ WAN Equipment
G ____ Carrier Services
H ____ Internetworking *(including Routers, Switches)*
I ____ Internet/Web/E-commerce
J ____ Intranet/Extranet
K ____ Remote Access *
L ____ Peripherals
M ____ Software
N ____ Services/Support
O ____ Storage

4. What is the total number of sites for which you have purchase influence?

(check ONE only)

1. ☐ 100+ 2. ☐ 50 to 99 3. ☐ 20 to 49 4. ☐ 10 to 19 5. ☐ 2 to 9 6. ☐ 1 7. ☐ None

5. What is the total number of Servers/Clients/LANs installed/planned at your location/in your entire organization?

(check ONE box in each column)

SERVERS At Location A		SERVERS Entire Org. B	CLIENTS At Location C		CLIENTS Entire Org. O	LANs At Location E		LANs Entire Org. F
☐	1. 50,000+	☐	☐	1. 50,000+	☐	☐	1. 50,000+	☐
☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐
☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐
☐	4. 100 to 999	☐	☐	4. 100 to 999	☐	☐	4. 100 to 999	☐
☐	5. 50 to 99	☐	☐	5. 50 to 99	☐	☐	5. 50 to 99	☐
☐	6. 10 to 49	☐	☐	6. 10 to 49	☐	☐	6. 10 to 49	☐
☐	7. 1 to 9	☐	☐	7. 1 to 9	☐	☐	7. 1 to 9	☐
☐	8. none	☐	☐	8. none	☐	☐	8. none	☐

6. What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

A. Scope (check ONE only)

CORPORATE:
1. ☐ Entire Enterprise/Multiple Enterprises
2. ☐ Division/Multiple Divisions
3. ☐ Department
4. ☐ None

B. Involvement (check ALL that apply)

1. ☐ Create Network/IT Strategy
2. ☐ Recommend/Specify Brand
3. ☐ Approve Purchase
4. ☐ Evaluate Products/Services
5. ☐ Determine the Need
6. ☐ None

7. What is the estimated number of employees at your location/in entire organization?

(check ONE in each section)

A. At your location:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 250 – 499
8. ☐ 100 – 249
9. ☐ 99 or less

B. Entire organization:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 499 or less

8. Please indicate the Internet/Intranet/WAN/LAN/Remote products/services that you are currently involved in purchasing or plan to purchase (check ALL that apply)

A. Currently involved in purchasing B. Plan to purchase

INTERNET/INTRANET

A B
☐ 01. ☐ VPN Equipment
☐ 02. ☐ VPN Services
☐ 03. ☐ Firewalls/Security/Encryption
☐ 04. ☐ Electronic Commerce Tools
☐ 05. ☐ Web Servers/Software
☐ 06. ☐ Internet Services
☐ 07. ☐ Web Hosting
☐ 08. ☐ Content Hosting
☐ 09. ☐ Traffic Management
☐ 10. ☐ Web Development Tools
☐ 11. ☐ Management/Monitoring Software
☐ 12. ☐ Web Based Management Tools
☐ 13. ☐ Web Based Collaboration/Groupware
☐ 14. ☐ Web Acceleration/Caching/Load Balancing Products
☐ 15. ☐ Other Internet/Intranet

LANs/INTERNETWORKING

A B
☐ 16. ☐ Local-Area Networks
☐ 17. ☐ Network Operating System Software (NOS)
☐ 18. ☐ Intel Based Servers
☐ 19. ☐ Intel Based Multiprocessor Servers
☐ 20. ☐ RISC Based Servers
☐ 21. ☐ Clustered Servers
☐ 22. ☐ Print Servers
☐ 23. ☐ Routers
☐ 24. ☐ Layer 2 Switches
☐ 25. ☐ Layer 3 Switches
☐ 26. ☐ Layer 4-7 Switches
☐ 27. ☐ ATM Switches
☐ 28. ☐ Token-Ring Switches
☐ 29. ☐ Network Storage (NAS, SANs)
☐ 30. ☐ Storage/Backup (Optical, Disk, Tape, RAID)
☐ 31. ☐ Network Test/Diagnostic Tools
☐ 32. ☐ UPS
☐ 33. ☐ Network Interface Cards (NICs, PCMCIA)
☐ 34. ☐ Hubs/Intelligent Hubs/Stackable Hubs
☐ 35. ☐ Cables,Connectors, Baluns
☐ 36. ☐ Management Frameworks
☐ 37. ☐ Call Center Tools
☐ 38. ☐ Voice over LAN
☐ 39. ☐ Other Local-Area Network/Internetworking

REMOTE/WIRELESS

A B
☐ 40. ☐ PDAs
☐ 41. ☐ Remote Access Products
☐ 42. ☐ Remote Access Services
☐ 43. ☐ Wireless Data Equipment/Services
☐ 44. ☐ Other Remote/Wireless

WAN EQUIPMENT & SERVICES

A B
☐ 45. ☐ Modems
☐ 46. ☐ Cable Modems
☐ 47. ☐ Asynchronous Transfer Mode (ATM)
☐ 48. ☐ Frame Relay Equipment including FRADS
☐ 49. ☐ Frame Relay Services
☐ 50. ☐ ISDN Equipment/Services
☐ 51. ☐ FT-1/T-1/T-3 Services
☐ 52. ☐ xDSL Services/Products
☐ 53. ☐ Diagnostic/Test Equipment
☐ 54. ☐ DSU/CSU
☐ 55. ☐ PBXs
☐ 56. ☐ Voice/Video over IP Gateways
☐ 57. ☐ Videoconferencing
☐ 58. ☐ Managed LAN/Router Services
☐ 59. ☐ Fax Servers/Services
☐ 60. ☐ Other WAN Equipment/Services

None of the above (1 – 60) A ☐ 61. B ☐

9. Please indicate the Network hardware/software/services that you are currently involved in purchasing or plan to purchase: (check ALL that apply)

A. Currently involved in purchasing B. Plan to purchase

SYSTEMS/PERIPHERALS

A B
☐ 01. ☐ Laptops/Notebooks
☐ 02. ☐ PCs
☐ 03. ☐ Windows Terminals/Thin Clients
☐ 04. ☐ Workstations
☐ 05. ☐ Storage/Backup (Optical,Disk,Tape,RAID)
☐ 06. ☐ Printers
☐ 07. ☐ Printer/Fax/Copier Hybrids (Multifunction Printers)
☐ 08. ☐ Minis
☐ 09. ☐ Mainframes
☐ 10. ☐ Fax/Modem Boards
☐ 11. ☐ Memory/Chips/Boards/Cards
☐ 12. ☐ Other Computers/Peripherals

SOFTWARE/APPLICATIONS

A B
☐ 13. ☐ Network Management (incl. SNMP)
☐ 14. ☐ Systems Management
☐ 15. ☐ Security
☐ 16. ☐ Directory Services
☐ 17. ☐ Operating Systems
☐ 18. ☐ Applications Development Tools
☐ 19. ☐ Database Management/RDBMS
☐ 20. ☐ Groupware
☐ 21. ☐ E-Mail
☐ 22. ☐ Enterprise Resource Planning (ERP)
☐ 23. ☐ EDI
☐ 24. ☐ Desktop Videoconferencing
☐ 25. ☐ Imaging
☐ 26. ☐ Middleware/Serverware
☐ 27. ☐ Document Management
☐ 28. ☐ Site Metering Tools
☐ 29. ☐ Data Warehousing
☐ 30. ☐ Anti Virus Software
☐ 31. ☐ Multimedia
☐ 32. ☐ Helpdesk
☐ 33. ☐ Other Software/Applications

SERVICES

A B
☐ 34. ☐ BPO (Business Process Outsourcing incl. Financial Services, HR, Logistics, etc.)
☐ 35. ☐ ASP Services
☐ 36. ☐ Call Center Outsourcing
☐ 37. ☐ Systems Integration/Consulting
☐ 38. ☐ Education/Training Services
☐ 39. ☐ Other Services

None of the above (1 – 39) A ☐ 40. B ☐

10. Please indicate the platforms that are currently installed/planned: (check ALL that apply)

A. Currently installed B. Planned for purchase

NETWORK PROTOCOLS

A B
☐ 01. ☐ TCP/IP
☐ 02. ☐ IPV6
☐ 03. ☐ SNA
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS/NETBUEI
☐ 07. ☐ NFS
☐ 08. ☐ SNMP
☐ 09. ☐ HTTP
☐ 10. ☐ Other Network Protocols

LAN/WAN ENVIRONMENT

A B
☐ 11. ☐ Gigabit Ethernet
☐ 12. ☐ Switched Ethernet
☐ 13. ☐ Fast Ethernet
☐ 14. ☐ Ethernet
☐ 15. ☐ ATM
☐ 16. ☐ Token Ring/Token Ring Switching
☐ 17. ☐ Layer 3,4 Switching
☐ 18. ☐ FDDI
☐ 19. ☐ 100Base-T
☐ 20. ☐ 10Base-T
☐ 21. ☐ Fibre Channel
☐ 22. ☐ Wireless LANs
☐ 23. ☐ DSL
☐ 24. ☐ ISDN
☐ 25. ☐ Frame Relay
☐ 26. ☐ Private Line T1, T3, FT-1, SONET
☐ 27. ☐ Other LAN/WAN Environment

NETWORK OPERATING SYSTEM

A B
☐ 28. ☐ Windows NT/Windows 2000
☐ 29. ☐ Novell (NetWare 5.X)
☐ 30. ☐ Novell (NetWare 4.X)
☐ 31. ☐ Novell (NetWare 2.X,3.X)
☐ 32. ☐ LINUX
☐ 33. ☐ Microsoft (LAN Manager)
☐ 34. ☐ Banyan (Vines)
☐ 35. ☐ IBM (LAN Server)
☐ 36. ☐ Other Network Operating System

COMPUTER OPERATING SYSTEM

A B
☐ 37. ☐ NT Workstation
☐ 38. ☐ Windows 2000
☐ 39. ☐ Windows 98/95/3.1
☐ 40. ☐ Intel based UNIX
☐ 41. ☐ RISC based UNIX (incl. SOLARIS)
☐ 42. ☐ LINUX
☐ 43. ☐ DOS
☐ 44. ☐ OS/2,OS/2 WARP
☐ 45. ☐ OS/400
☐ 46. ☐ IBM MVS/VM/VSE/ESA
☐ 47. ☐ Digital VMS
☐ 48. ☐ Macintosh
☐ 49. ☐ Other Computer Operating System

None of the above (1 – 49) A ☐ 50. B ☐

11. Which of the following hardware platforms are installed/planned in your company?

(check ALL that apply)

A - Mainframes (Large Scale)
1. ☐ IBM
2. ☐ Other

B - Minis (Midrange)
1. ☐ IBM RS/6000
2. ☐ IBM AS/400
3. ☐ Digital/Tandem/Compaq
4. ☐ Unisys
5. ☐ H-P
6. ☐ Other

C - Workstations
1. ☐ Sun Microsystems
2. ☐ H-P
3. ☐ Digital/Compaq
4. ☐ IBM
5. ☐ Silicon Graphics
6. ☐ Other

12. What is the estimated gross revenue of your entire company/institution?

(check ONE only)

1. ☐ $20 Billion or More
2. ☐ $10 Billion to $19.9 Billion
3. ☐ $1 Billion to $9.9 Billion
4. ☐ $500 Million to $999.9 Million
5. ☐ $100 Million to $499.9 Million
6. ☐ $50 Million to $99.9 Million
7. ☐ $10 Million to $49.9 Million
8. ☐ $5 Million to $9.9 Million
9. ☐ $4.9 Million or Less
10. ☐ None of the above

13. For which areas outside of the U.S.A. do you have purchase influence?

(check ALL that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East
6. ☐ Africa
7. ☐ Canada
8. ☐ None

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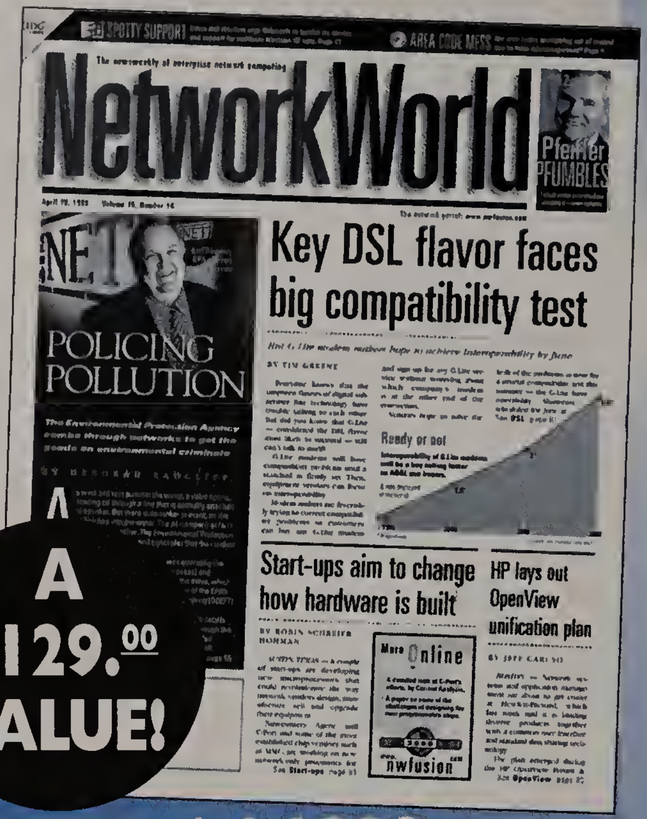
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BY *NETWORK WORLD* STAFF

Power prognosticator

Six **top** news reporters share their **predictions** for the year ahead.

Handicapping the top guys at WorldCom, AT&T and Sprint

By Denise Pappalardo

While industry pundits can dispute which company — AT&T, Sprint or WorldCom — is in worse shape, the fact is, each has a big cross to bear: consumer voice.

The question is whether these companies bounce back with their current leadership. It's highly probable that at least one of the three CEOs will be ousted. Here's what you can expect:

WorldCom, like competitor AT&T, is restructuring. The company will focus squarely on building business service revenue while spinning its declining consumer division into a separate unit with its own tracking stock called MCI. The network assets and high-growth business services will operate under the WorldCom banner.

But the plan is flawed from a customer perspective. WorldCom made clear that it would not offer lower service rates to encourage long-term contracts. So customers may not get the same cost-saving deals they've come to expect. Another problem is that WorldCom is not known for stellar customer service. I've talked with WorldCom customers who aren't sure who their sales representatives are or are unhappy about services not being delivered in a timely manner.

While WorldCom, AT&T and Sprint have to worry about shareholder return and profits, I don't think there is a CEO in the industry more blinded by the bottom line than WorldCom's Bernie Ebbers. Don't be surprised to see him part ways.

AT&T CEO C. Michael Armstrong might not be far behind. Armstrong disappointed Wall Street and analysts when he announced his major restructuring in October. He showed signs of weakness for the first time since his risky acquisitions of TCI and MediaOne, according to one analyst.

Armstrong had always stuck to his guns in arguing that AT&T's cable acquisitions would pave the way to innovative services while letting AT&T bypass incumbent local exchange carriers.

Now he's wavering, saying the company's decline in market valuation has been nothing short of alarming.

Armstrong has said publicly he sees himself retiring after 2002, but he may not last that long.

Sprint's Bill Esrey has the best chance of making it through 2001 to continue his 15-year reign as CEO. Sprint has not announced a restructuring plan but instead is trying to recover momentum after having lost precious time trying to merge with WorldCom.

Sprint's consumer voice business is not declining as fast as its competitors'. Also, Sprint's wireless and Internet service revenue grew by 50% in the third quarter of 2000 compared with the same quarter of 1999. These are Sprint's saving graces.

If Sprint can continue to post strong growth in Internet and wireless while improving data service growth, Esrey's position should be secure. ◪

See **Prognosticator,** page 26

ILLUSTRATIONS BY M. SUTESKI

Prognosticator, continued from page 25

'Net privacy law: It's only a matter of time

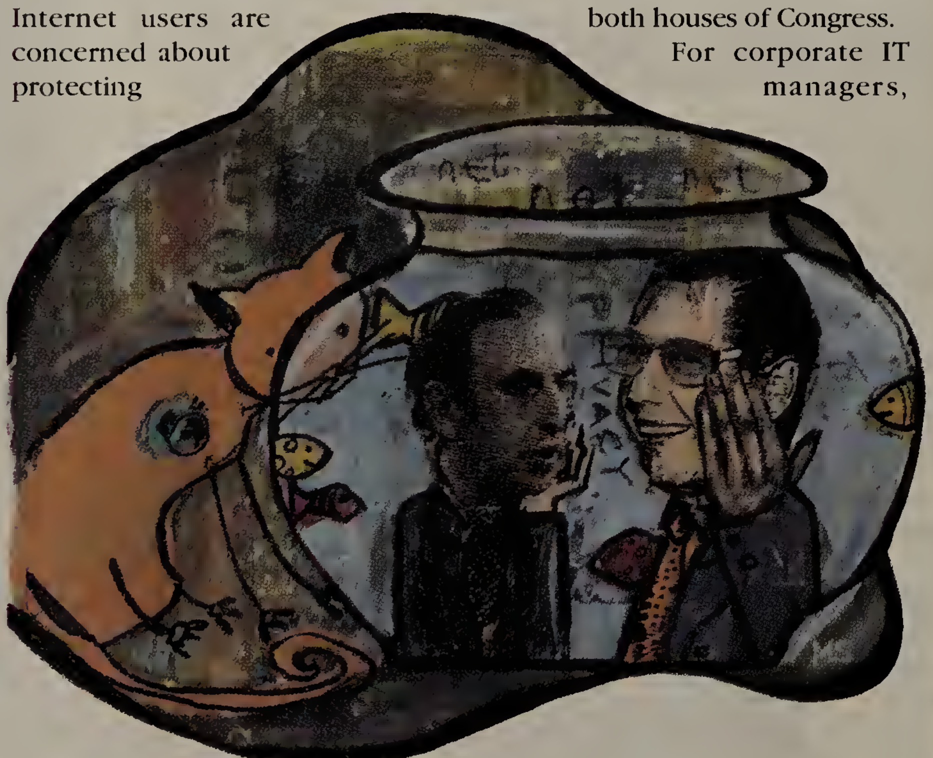
By Carolyn Duffy Marsan

Privacy advocate and entrepreneur Austin Hill tells a funny story that sums up the conundrum of online privacy.

If you ask a roomful of 100 people whether they care about online privacy, 80 people will raise their hands, he says. If you ask the same roomful of people if they are willing to donate a DNA sample in exchange for a free Big Mac, 80 people will raise their hands.

As long as the DNA samples are used in aggregate for research, the donors won't mind, Hill continues. But when their HMO calls and cancels coverage because of a genetic problem, they'll be furious because their personal information was sold without their approval.

Therein lies the dilemma for policymakers. On one hand, Internet users are concerned about protecting their privacy while online. On the other, consumers are quick to give up their right to privacy in exchange for discounts, freebies or any perceived personal gain.



That's why lawmakers will tread carefully on the Internet privacy issue when the 107th Congress convenes in January. Experts predict that the next Congress will pass online privacy legislation, which will likely be an opt-out system favored by Internet businesses rather than an opt-in system recommended by consumer groups.

Momentum seems to be building for opt-out legislation that mandates notice and choice. Under this type of legislation, companies must notify consumers about what personal information they are collecting and how they'll use that information.

They also must give consumers the choice to opt out of data collection. Such legislation will likely include stiff penalties and strong enforcement. Opt-in legislation, on the other hand, would require Web site operators to get permission from consumers before gathering information about them online. Privacy advocates favor opt-in legislation based on inviolable consumer privacy rights.

Congress has passed notice-and-choice legislation for financial institutions, known as the Gramm-Leach-Bliley Act. Similar legislation for the health-care industry is pending in both houses of Congress.

For corporate IT managers, the challenge is to put a technical solution in place now that is nimble enough to adjust after privacy legislation passes. At a minimum, your Web site should support notice and choice. You also should start thinking about what systems and processes are required for an opt-in system.

As difficult as this chore may seem, you should keep your fingers crossed that the 107th Congress does address online privacy. That's because it'll be much easier for you to deal with one federal online privacy law than a patchwork of 50 different state laws.

Online privacy legislation is coming. Smart IT managers will be ready for it. ◪

Your worst security nightmare

By Ellen Messmer

It would be easy to say another Melissa virus or a distributed denial-of-service attack — probably from some jerk with a name like Kaos Kid — is bound to wreak havoc on corporate security defenses next year. But I'd argue that the bigger threat is simply the dissemination of false information about your company — information that could destroy everything you've worked to create. These lies spread quickly on the Web and in chat rooms, and can turn into an avalanche of bad publicity when picked up by "legitimate" news sources that don't bother to check their facts.

Take the case of Emulex, turned upside down in an instant last Aug. 25 by a news service called Internet Wire. The news service passed along an intentionally erroneous press release contending that Emulex would be revising earnings statements for the past three years from gains to losses and that its CEO had quit.

The information was picked up by news organizations Bloomberg and Dow Jones, and Emulex stock plunged more than 60% that morning. The bad news about Emulex was a hoax perpetrated by a former Internet Wire employee who was apparently speculating in Emulex stock.

Robin Schnug, Emulex public relations manager, says she's sure the news organizations that got fooled tried to verify the "facts" but when they couldn't reach an Emulex contact, they repeated the bogus information anyway.

Emulex now makes sure its staff is reachable through phone or beeper at any time.

The news wires that disseminated the lie about Emulex were gullible, Schnug says. They didn't use common sense to question why a corporation would issue such extraordinary news at an odd hour without the benefit of a press conference.

The former Internet Wire employee, who was arrested, apparently posed as a public relations person on the phone and tricked a late-night Internet Wire crew into posting the fake release.

As might be expected, Emulex believes news sources should bolster their security procedures.

Of course, technologies such as secured servers, digital watermarks and public-key infrastructure certificates could add a level of trust to this kind of Web posting . . . if anyone would ever bother to use them. ◪

Microsoft will be king of the court

By John Fontana

The year 2001 will be the one in which Microsoft supplants Teflon as the world's best nonstick surface.

What won't stick to the software giant is the June 2000 ruling by Judge Thomas Penfield Jackson that Microsoft is a monopoly and should be broken in two.

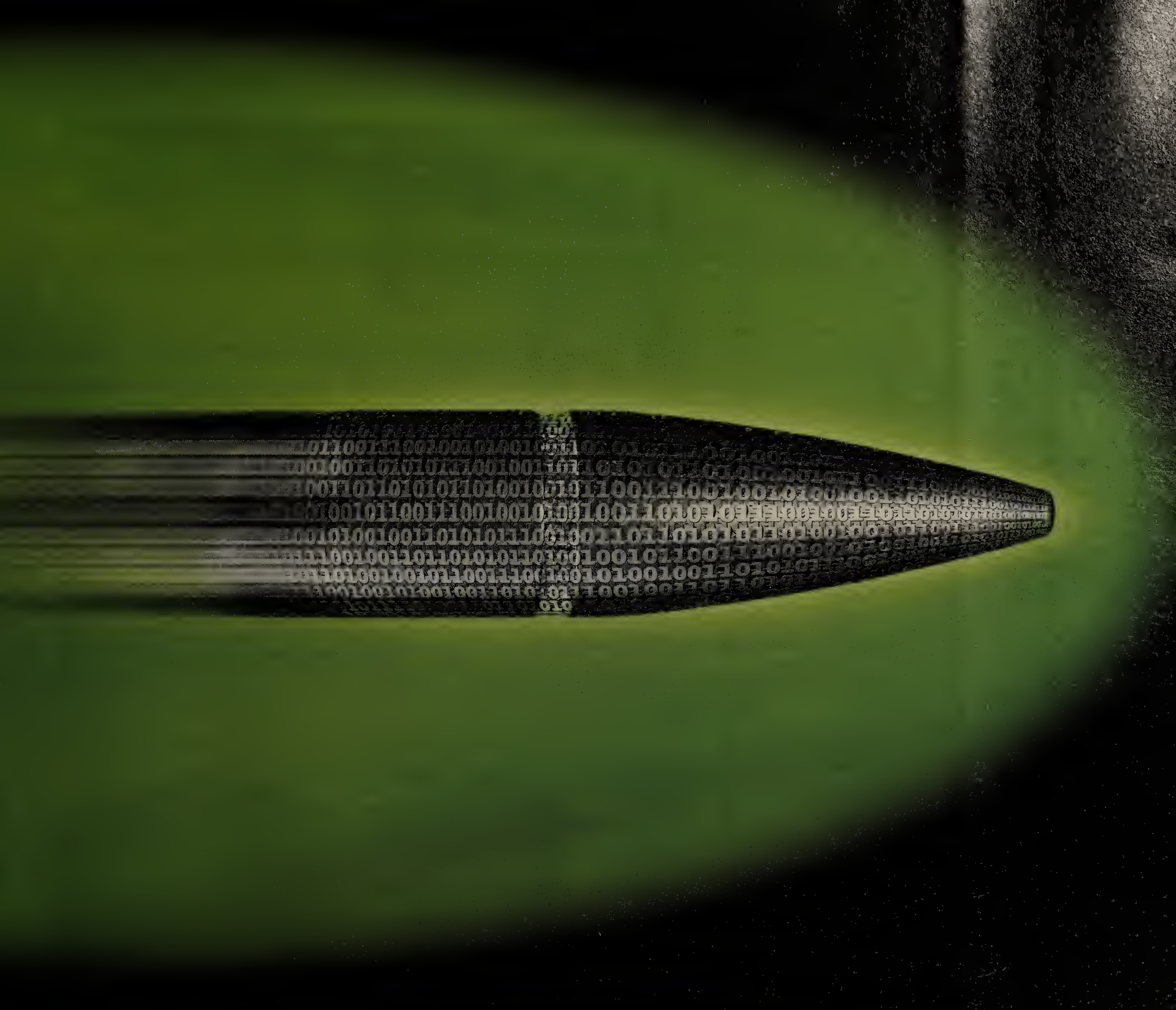
It won't stick in part because in February, Microsoft will be in a much friendlier place than Jackson's courtroom, where the company was repeatedly embarrassed. This time the software giant and the Department of Justice will tussle in the U.S. Court of Appeals for the District of Columbia Circuit.

In 1998, the same court ruled in Microsoft's favor, saying it was difficult for the government to prove that the company unlawfully "tied" its operating system and browser. The government contends Microsoft did just that to crush rival Netscape.

The legal issue of "tying," where a buyer must purchase one product to get the other, has been one of the nuts of this case. That nut will crack in June, when Microsoft wins on appeal and the sides prepare for the next step in front of the Supreme Court in the fall.

Microsoft must only prove plausible benefits from integrating the operating system and the browser. The appeals court ruled in 1998 that was indeed the case, calling the union of Windows 95 and Internet Explorer "a genuine integration."

See **Prognosticator,** page 28



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Prognosticator, continued from page 26

The Justice Department has recognized that it failed to refute that ruling during the trial.

But the case goes beyond the issue of tying. Microsoft also will benefit from Jackson failing to show the anticompetitive effects of the company's behavior. Indeed, Jackson conceded in his ruling that Microsoft did not foreclose the browser market to Netscape.

Legally, the cards are beginning to stack up in Microsoft's favor, even though the government enters the appeals process with Jackson's ruling snug in its pocket.

The only wrinkle is President-elect George W. Bush, who will take office a month before arguments begin in the appeals court. Bush has not commented specifically on the case, but says he favors competition over litigation. He will appoint the assistant attorneys general who will oversee the case, and that could be a feather in Microsoft's cap. With Bush, the case could easily end with a settlement that meets his political goals and gives Microsoft a result far short of a breakup. ◪

MSP: more than another new acronym

By Michael Martin

In the past year, management service providers have moved rapidly from nothing to a significant force, and we have little reason to believe that momentum will change in 2001.

Simply, the MSP business model makes sense. Small and midsize businesses can't afford expensive enterprise software management packages or the highly trained and experienced personnel required for implementing and maintaining such software. But these businesses still have mission-critical networks.

MSPs give small and midsize businesses the ability to manage their networks at a reasonable price by selling them access to management tools on a monthly subscription basis. A midsize business may not be able to throw down tens of thousands of dollars on a network management tool, but it can afford a few hundred dollars per month to make sure its network is healthy.

MSPs will continue working the small to midsize business domain in 2001. They'd see little benefit in targeting larger IT shops, which can afford their own management packages and the people to maintain them. Most large companies already have complex management systems in place and have little incentive to throw those investments away to move to an MSP, at least in the short term.

Also, BMC Software, Hewlett-Packard, Tivoli Systems and other management software vendors that sell the tools MSPs use to monitor customer networks aren't going to let MSPs snatch away their large bread-and-butter accounts.

Ultimately, these vendors will get into the MSP market by setting up their own MSP divisions or through acquisition.

Now more than 50 companies call themselves MSPs and have their own industry-promoting association. But we should see some market consolidation in 2001, with specialty MSPs merging or partnering with MSPs offering a broader array of system and network management services. Customers like one point of contact, after all. ◪

No more dreamin' about streamin'

By Jason Meserve

After years of small pictures and jittery video, the age of streaming media to the desktop is set to arrive in 2001. Soon, VHS-quality video will be deliverable on the desktops of companies looking to distribute corporate communications and training materials to employees virtually anywhere in the world.

The years of unwarranted hype are over. Vendors of all types — hardware, software and services — are starting to solve the problems of delivering streaming media, especially large video files, across the Internet.

Prior to 2000, only software companies such as RealNetworks, Apple and, more recently, Microsoft have worked on the problems from a compression standpoint. With each successive release of their respective servers, codecs and media players, the three companies have increased video and audio quality while decreasing the size of the files. The recent release of RealAudio 8 can deliver near CD-quality sound over a 32K bit/sec connection, two-thirds the bandwidth used by RealAudio 7. Similar strides are being made with video.

Despite the decreasing bandwidth needs of the codecs and clients, the Internet is still a tricky place to deliver streaming media. Packet loss and unpredictable latency times greatly degrade the viewing and listening experience.

With e-mail and Web browsing, there's time to resend lost or out-of-order packets. But not with video — packets must arrive basically in order and at a constant rate to maintain quality.

Now hardware and service providers are getting into the act, building content-delivery networks that are designed to push content closer to end users and server architectures optimized for streaming media delivery. In 1999, companies such as Akamai Technologies and Digital Island built overlay networks for speeding Web page delivery. In 2000, these same companies added support for streaming media, with others, such as Exodus Communications, FastForward Networks and Speedera Networks, getting into the act. These service providers offer different means to push content closer to the end user, reducing the number of hops in the network path and therefore reducing the chance of dropped packets.

With the combination of better codecs that use less bandwidth and improved delivery networks, streaming media is set to take off. ◪

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Tuesday, January 30th

General Colin L. Powell
U.S.A. (Retired)

Wednesday, January 31st

Clarence J. Chandran
Chief Operating Officer
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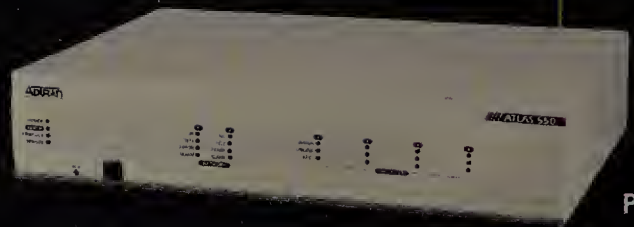

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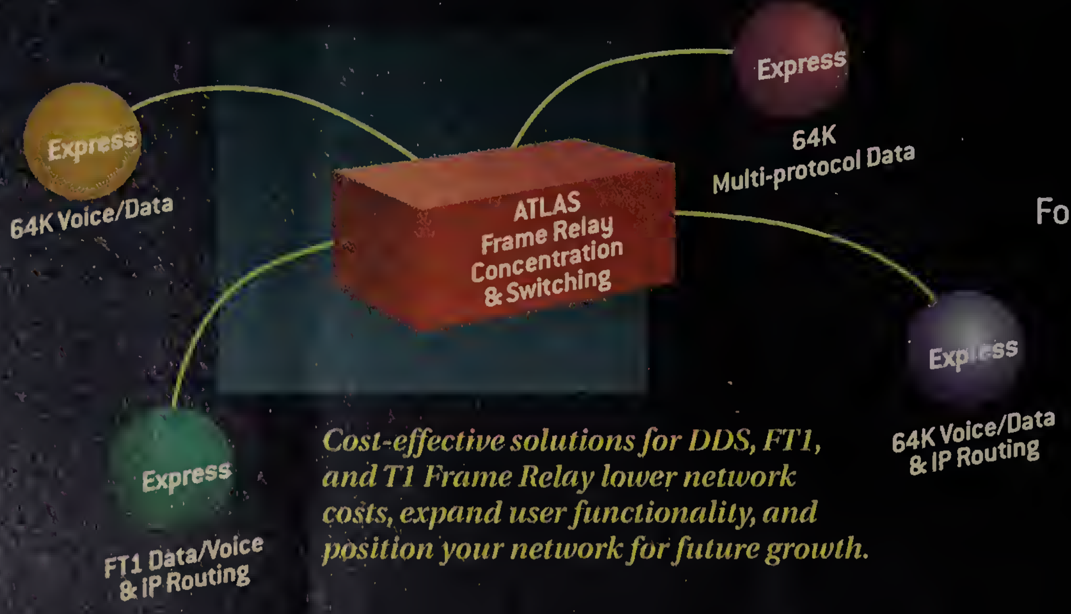

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BY JULIE BORT

The power of knowledge

Ideas have become a gold mine. IT should play a big role in identifying and enabling intellectual property.

Innovation is tough if you're working in a silo. Knowledge management opens the doors, says Ann Noles, knowledge champion for credit card giant Capital One Financial Corp.

Sir J. Arthur Thomson, famous scientist and author of the 1920s, once said: "The most powerful factors in the world are clear ideas in the minds of energetic men of good will."

Nowhere is that becoming truer than in 21st century business.

By all accounts, the nation is undergoing a sort of innovation jubilation: Patents are rising, best-selling books give advice on intellectual property, companies sell newly created technologies to one another via e-marketplaces, and a multibillion-dollar knowledge management software market has arisen.

The number of patents filed has climbed significantly in the late 1990s. In 1997, the U.S. Patent and Trademark Office granted licenses to 124,068 applications. In 1998, it granted 163,147, and in 1999 (the latest year for which figures were available), 169,094. That's a 36% increase in just two years. Business processes are also increasingly targeted for patent applications — items such as one-click e-commerce purchasing. About 2,500 applications now flood the Patent Office annually for "business-method software," reports the Massachusetts Institute of Technology's *Technology Review* magazine.

Business philosophers have dubbed current times the "idea economy," stemming from the 1995 book of the same name by Roger Hendrix, a management consultant, and Rob Brazell, an Internet entrepreneur whose third start-up, IdeaExchange, is an auction site for intellectual property.

Other bestsellers are spouting a similar analysis (www.nwfusion.com, DocFinder: 1721). For example, how knowledge and collaboration benefit corporations is the subject of *The Social Life of Information*, by John Seely Brown, chief scientist at Xerox, and Paul Duguid, a research specialist at the University of California at Berkeley.

This idea economy is leading to a capitalist conclusion: e-marketplaces that traffic in patents and intellectual property (www.nwfusion.com, DocFinder: 1942). For example, Eastman Kodak recently sold a chemical patent license to a German firm via The Patent & License Exchange Web site, at www.pl-x.com.

BY JULIE BORT

If intellectual property has become the true product of every business, then where do you fit in? It depends. You can ignore the phenomenon and be relegated to service repair status; you can help foster innovation with tools; or you can drive revenue-generating ideas that put IT at center stage.

Back to school

Old-school thinkers consider IT the guard dog of intellectual property. Its role is to secure the network so no one can steal information. Beyond that, IT folks should stay out of the business strategy.

"Companies need to define their problems at a strategic level. This can be done completely without IT," contends David Coleman, managing director of Collaboration Strategies, a knowledge management consultant. "It's much more time-consuming and expensive once IT gets involved."

More progressive thinkers consider IT to be an enabler.

"At Capital One, IT is always included. Just because I'm in IT doesn't mean I can't be a thought leader," insists Ann Noles, knowledge champion for credit card giant Capital One Financial Corp., in Falls Church, Va.

The idea of IT as an enabler is seen in the booming knowledge management software market. It will grow from $1.4 billion in 1999 to $5.4 billion in 2004, predicts IDC, a market research firm in Framingham, Mass.

Knowledge management software attempts to tap equally into the knowledge stored in people's heads and that stored through IT in databases, data warehouses and enterprise resource planning applications. Through knowledge management systems, employees relate problem-solving stories, identify in-house experts and find needed tidbits from vast document stores.

As an enabler, protecting intellectual property is still IT's goal, but it's accomplished differently. You protect intellectual assets by giving employees the tools to create and use them. "It's difficult to innovate in a silo. Knowledge management connects people across business units," Noles says.

Enablers turn e-mail into intellectual property storehouses, build portals to make navigating back-end data easier and install real-time collaboration tools so remote workers can share ideas as if they're sitting around the same conference table.

A story told by John Old, a focus area leader with Texaco's IT group in Bellair, Texas, showcases this role. Texaco loves its e-mail, Old says. "Everyone uses e-mail. Outlook is the first thing they start in the morning, and they stay in it all day," he says.

Old and a co-worker began to ponder the vast amounts of data contained in Texaco e-mail. Within those thousands of daily conversations was invaluable problem-solving knowledge, undiscovered experts and project decisions about which others surely should know. Old wondered how Texaco could mine that data without violating employee privacy. He discussed the idea with David Gilmour, then chief research officer at Giga Information Group. A few weeks later, Gilmour called Old and pronounced, "John, you're the godfather of a start-up." Gilmour left Giga to found Tacit Knowledge Systems, a maker of e-mail mining software that protects privacy. Essentially, Tacit's KnowledgeMail product does what Old envisioned: It extracts and analyzes noun phrases in e-mail messages, while keeping senders' identities anonymous.

Tacit launched in November 1999, with Texaco among its first users. Texaco has been running KnowledgeMail in pilot mode, with about 500 users, for about a year, Old says. The pilot is proving fruitful, letting users find co-workers with the knowledge they need simply by searching the KnowledgeMail database. Texaco plans to use KnowledgeMail corporatewide but had not formalized plans by press time.

More common is the story of IT recognizing a grass-roots knowledge management effort, and stepping in to centralize and manage it. That's why Procter & Gamble began a huge, nine-month project to build a knowledge management portal for its 100,000 employees. Employees complained that they couldn't easily find information on their massive intranet, says Dan Gerbus, a project manager with P&G's Internet Applications Group, in Cincinnati. The group saw several business units trying to solve this problem on their own and decided to take action. "We saw that this was a project that made sense to bring central," Gerbus says.

Using Plumtree Corporate Portal from Plumtree, in San Francisco, P&G will give employees a single point of access to one million-plus intranet pages, thousands of Lotus Notes databases and documents scattered across various NT file servers. It will equip users with collaboration tools, charts from SAP data, Oracle Sales Analyzer and other data warehousing reports. From a single browser window, employees will get an at-a-glance view of the information needed to do their jobs.

To perform the enabler role well, IT folks must fully understand the business side. They need to know how people work, where the knowledge is being created and how to fit tools into work habits seamlessly, says Carl Kerwick, program manager for enterprise systems at MimEcom Corp., also a Tacit user (see story, page 34). "IT has to be involved in the architecture requirements. But I caution that the tool is not the process," says Kerwick, an IT professional by training who is now a business manager for this e-commerce outsourcer in San Francisco. "If the underlying business processes change, the IT person should change the knowledge management application. By doing that, you'll make knowledge worker productivity increase."

Knowing your own worth

In more avant-garde organizations, IT isn't just the enabler, but a rich source of intellectual property. For example, Merrill Lynch recently launched a $1 billion venture fund for seeding technology firms conceived by its employees.

In another example, the IEEE Communications Society initiated a pilot program that makes the society's intellectual property available over the Web and lets society members provide live consulting to queries. The society publishes an

See **Knowledge**, page 34

CAN YOUR IT DEPARTMENT BECOME AN OUTSIDE CONSULTING PRACTICE?

A tempting thought, but difficult to pull off.

If IT people are your greatest asset, why not hire them out as a consultants?

This "shared-services" model, where IT works on internal and for-hire projects, offers advantages yet is difficult to execute, says Don Walker, former CEO of the Information Technology Company (ITCO), a subsidiary of United Services Automobile Association (USAA), a financial services company in San Antonio, Texas. ITCO, USAA's 3,000-employee shared-services division, earned $612 million in revenue in 1999.

During his tenure as ITCO CEO, Walker was concurrently chief information officer of USAA. He left those positions in May 2000 to launch and become CEO of Veritect, a Reston, Va., division of security consulting giant Veridian.

Shared services converts IT from overhead to a profit-and-loss business, Walker says. "There is no better way to benchmark performance than in the outside marketplace." Eventually, the IT group can spin off and gain the advantages of stock options, such as the ability to attract top talent.

ILLUSTRATIONS BY JOE MURRAY

In ITCO's case, the department had no internal budget and could accept only 5% of its work from outside sources. The remaining revenue had to be earned from USAA, Walker recounts. USAA departments could choose another consultant, but with Walker as CIO, that was unlikely.

"I had to approve all outsourcing, because the CIO is responsible for everything. We couldn't have each department building its own network," Walker says.

In the long run, USAA wanted its IT talent all for itself, and ITCO management ceased pursuing contracts.

Others faced similar hardships. One Fortune 500 company recently suspended outside consulting, in operation since January 1998. "We were meeting with considerable success, and we did it for all the right reasons, like providing people with a growth opportunity," says a senior vice president of the shared-services division. "But we got to the point where we had to decide the long term. What is the sustainability? Are we really going to go out and compete with the major firms, like [Electronic Data Systems] and Andersen Consulting?"

A former senior vice president of the same firm concurs. "If you want to do it, you have to decide to do it. You need to look at resource allocation, look at the clients, internal and external, in the same way."

Still, it can be done. Look at Sabre, now an independent company following an initial public offering in 1996. It began life as the IT arm of American Airlines, owned by American's holding company AMR Corp.

— Julie Bort

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Agilent Technologies
Innovating the HP Way

BY JULIE BORT

Knowledge, continued from page 32

enormous number of white papers, articles, analysis and proposals in print and online. On wireless alone, it published 1,229 documents since 1999, says Jack Howell, executive director.

Typical search engines weren't helping researchers find the right bits of knowledge from these huge stores. They returned too many irrelevant results. Also, a Web search did nothing if the person needed to question an expert. For the pilot, the society chose MindCrossing's MindStores software, a Web storefront through which experts can sell documents and advice. It sorted its wireless intellectual property published since 1999 into seven main areas that drill down to 52 subareas. Once a MindStore visitor locates authors in the technical area needed, that visitor can contact available experts.

Many companies have been equally innovative in applying IT as intellectual property. Some have attempted to set up their crack network departments as outside consultants available for hire when not working on internal projects (see related story, page 32).

Others started with an IT idea, then bought the technology they needed to make their idea happen. For instance, drug maker Aventis Pharmaceuticals wanted to use the Web to build personal relationships with the patients who use its products without rocking the boat with physicians. "Physicians are our No. 1, 2 and 3 customers," says Kirk Schueler, senior vice president of e-business for Aventis and CEO of its new IT offshoot, MyDoc Online, Inc.

Aventis thought that if it could help physicians build Web pages for patient scheduling and other administrative tasks, it also could somehow use those pages to reach patients. But it had no expertise as an Internet software manufacturer. So it bought MyDoc Online, a maker of Internet software for doctor's offices that performs scheduling, authorizations and offers drug and health information.

Because Aventis knew a lot about its products, the diseases its drugs appeased and doctors' business practices, it only needed the technical expertise to turn this intellectual property into a new business unit, Schueler says. With the purchase of MyDoc Online, it launched a new division and began piloting the software.

With MyDoc Online, physicians create Web pages that can schedule appointments, manage patient questions, process insurance authorizations and so on. Patients prescribed Aventis drugs can also create Web pages. They can fill the pages with tools to help them with their condition, from information on the drug to advice on lifestyle changes that can help their disease. Doctor and patient can also communicate with Aventis via the Web pages created with MyDoc Online.

A drug company sponsoring a suite of Web applications is "a new model," Schueler says, noting that Aventis hasn't yet worked out details of how that new model will generate revenue. MyDoc Online could become a subscription service or offer fee-based services, such as checking insurance eligibility.

Still others have spun out start-ups from a document database. That was the genesis of MSDS Online, a Web site that manages material safety data sheets for hazardous chemicals. MSDS are required by the Occupational Safety and Health Administration to be available to any business that uses, stores or sells hazardous material.

The IEEE Communications Society sees its reach expanding as it shares intellectual property via a sophisticated Web-based knowledge store, says Jack Howell, the group's executive director.

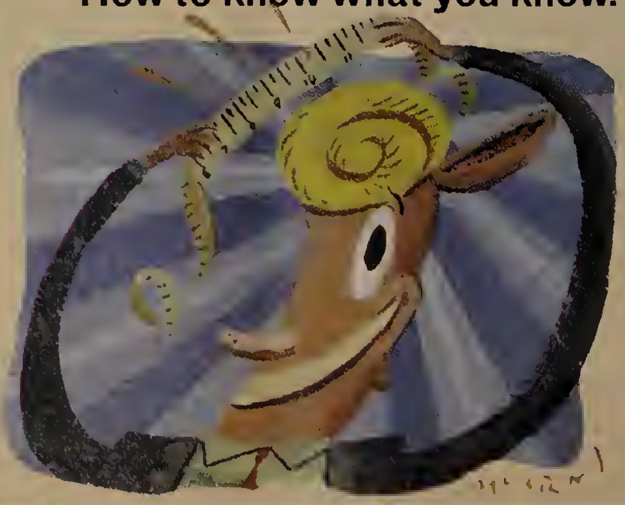
Co-founded by a venture capitalist and his network consultant brother, the firm began as an integrator for building internal MSDS databases, a service it still performs. As it grew its store of MSDS, it launched a Web site to distribute them, which led the company to create software products for makers of hazardous materials. The software lets chemical makers write Web-enabled MSDS and distribute them via the Web. This then caused fob.com, makers of procurement software for the chemical industry, to purchase MSDS Online, says Kyle Pope, vice president of data services for MSDS Online, in Chicago.

"IT people are out there every day in the trenches," Pope says. They stare at valuable intellectual property constantly but often fail to recognize it as such, he says. To spot it and harness its power, "look for something you are doing because you can't find anyone else to do it for you. Look for something that has a mass audience ... and that can be productized."

And be sure to pipe up when you've found that great idea, Pope encourages. Or, to apply the words of IBM's founding father, Thomas J. Watson, "Follow the path of the unsafe, independent thinker. Expose your ideas to the dangers of controversy. Speak your mind, and fear less the label of 'crackpot' than the stigma of conformity. And on issues that seem important to you, stand up and be counted at any cost." ◪

THE KNOWLEDGE ASSESSMENT

How to know what you know.



Analysts place failure rates of knowledge management systems at between 20% and 50% of all projects implemented. Keeping your project from becoming such a statistic means understanding how ready employees are to accept this technology. Enter the knowledge audit.

A knowledge audit entails interviewing users to find out what's going on in their heads, says Steve Gillespie, knowledge manager for Sun's Educational Services' knowledge management practice in Broomfield, Colo. Where is the knowledge being created, how is it being created, and how is it being used? Then ask the same questions about databases and document stores.

Through this process, you might learn that knowledge is being created during in-person meetings, after which everyone e-mails their notes around and stores independent versions on hard drives. More meetings are scheduled to share the revised notes, setting off the cycle again.

Ultimately, this process results in a new product, service or customer contract. If follow-up meetings were eliminated, this would save anywhere from days to weeks.

Gillespie also recommends determining whether the knowledge is relevant to a specific business objective. This will help you cost-justify the necessary software. And check to see that the knowledge is being created accurately. Are people actually using the knowledge once it is created (important for databases and documents)? On the technology side, is the technology available to support and ease this process?

— Julie Bort

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SiteAssure. It's how smart sites work.

Has Johnny looked into SiteAssure? My son, Bobby, deployed it on his servers so he doesn't have to constantly watch over his systems or bother with yucky administrative duties. In fact, he has SiteAssure automatically taking care of site failures, sometimes even before they happen!
My son Bobby...he's so smart.

My son's site is going down all the time. He spends all day restarting machines and dealing with angry customers. Poor Johnny.

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Wants to change the world

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You're investing a small fortune integrating e-commerce into your core business processes and technologies. You need an e-CRM solution. More employees are mobile and working remotely. And on the horizon shines the future of converged networks, with easier integration, user access and management. You need a technology investment strategy. One that lets you build advanced solutions today and evolve to a converged network without losing valuable time or money on the applications. You need HiPath, Siemens Enterprise Network Architecture. Be it conventional, IP or hybrid networks. Network neutral applications. All the services you need to realize your vision. HiPath handles it all. Learn more at **www.icn.siemens.com/converge**

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network bus

25 most powerful peop
in networking

Who holds the power in
Find out in our annual list of the 25 most

5

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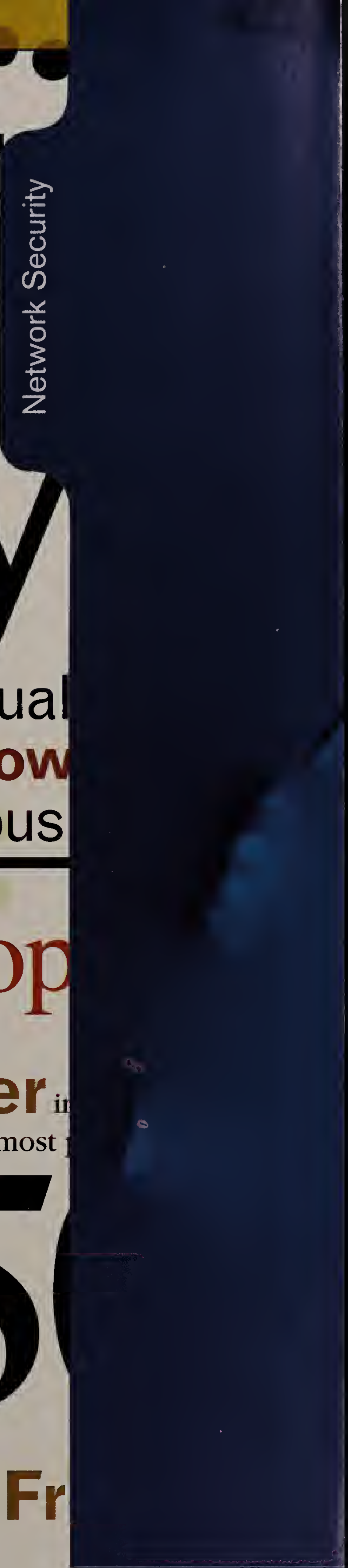
2000
Powerometer: CEO power drain

Cisco's John Chambers storms the top spot in our annual reader poll of the most powerful vendor CEOs; he's one of the few executives who fared well on the list.



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Top Layer

BY JULIE BORT
AND JIM DUFFY

The most powerful people in networking

Like the superhuman characters who fill the pages of your favorite comic books, the 25 most powerful people in networking have their own special powers. Who's to say that Vinod Khosla, a general partner with Kleiner, Perkins, Caufield & Byers, doesn't have a sort of X-ray vision — a psychic view into the future.

He has certainly demonstrated clairvoyance in his choice of companies and technologies to back. Khosla's been incredibly influential in optical networking and is now doing the same in the application service provider market.

Undoubtedly people like Carl Yankowski, CEO of Palm, or Ellen Hancock, CEO of Exodus Communications, must feel like they're holding the world in their hands. Their respective products and services are in high demand, and they're changing the way the world conducts business.

Then we've got executives like AT&T Chairman C. Michael Armstrong and WorldCom President Bernie Ebbers. Certainly they're hoping that, like Spider Man, they'll be endowed with special sticking power. Their mighty empires are deeply troubled these days, and if their corporate rebuilding strategies crumble, they just might find themselves falling into oblivion and off our Power 25 list for 2001.

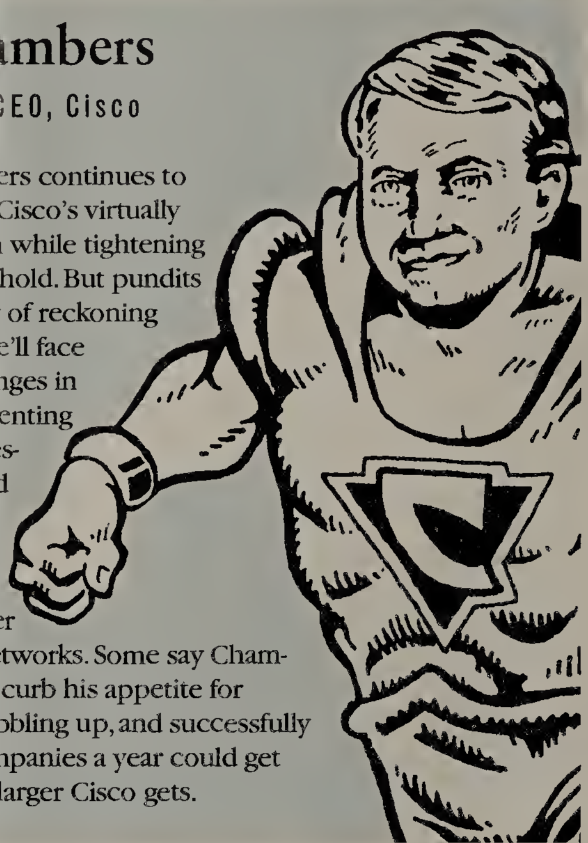
Of course, Armstrong and Ebbers wouldn't be the first perennial favorites to vanish into thin air. Gone from our Power 25 list this year, for example, is Rich McGinn, ousted Lucent CEO (for obvious reasons), and William Kennard, chairman of the Federal Communications Commission. With this year's election revealing no mandate, it's hard to tell who in Washington will remain magnates and who will become has-beens. And gone, but not forgotten, is Eric Schmidt, Novell's CEO. His power is so seriously on the wane, we've bumped him down to our "50 others" category (see page 38).

ILLUSTRATIONS BY GEORGE TOOMER

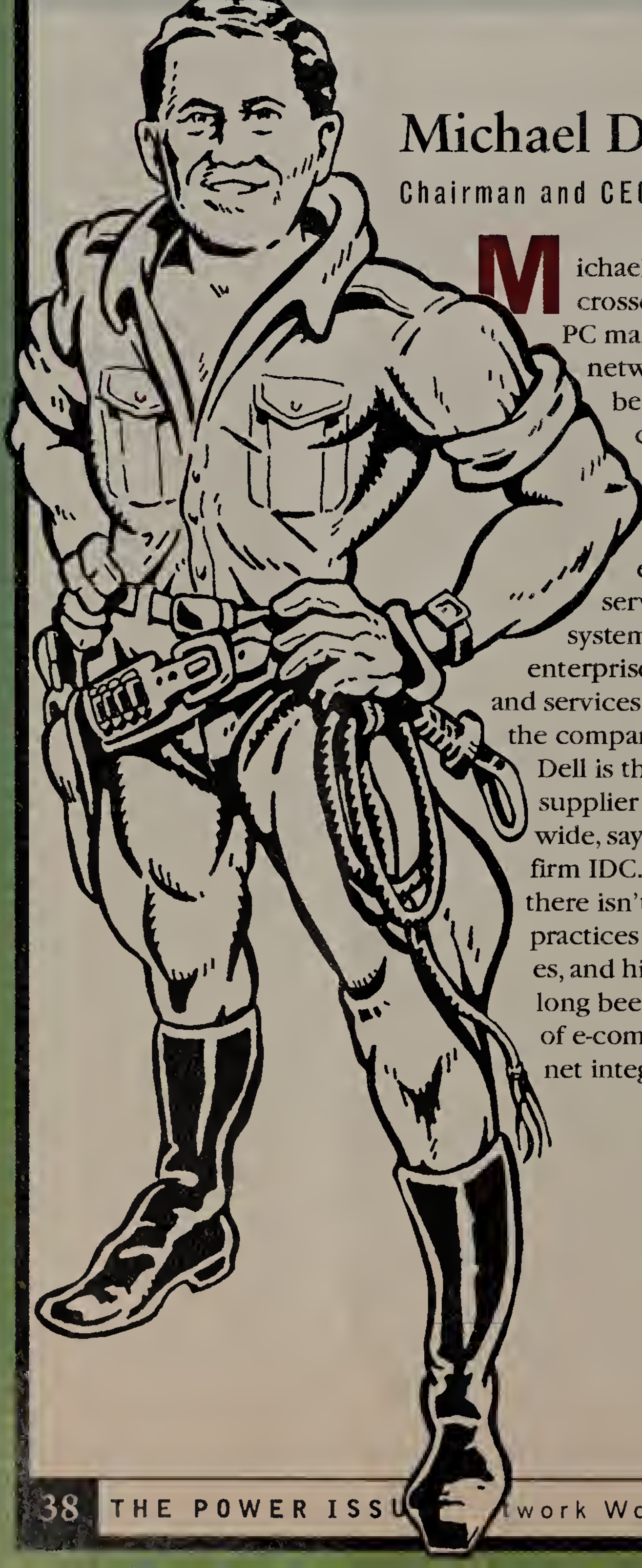
Builders of the infrastructure

John Chambers

President and CEO, Cisco



John Chambers continues to orchestrate Cisco's virtually flawless execution while tightening its market stranglehold. But pundits say Chamber's day of reckoning will soon come. He'll face some steep challenges in 2001, such as cementing the company's presence in optical and wireless, and batting down focused start-ups such as WAN router vendor Juniper Networks. Some say Chambers also needs to curb his appetite for acquisitions — gobbling up, and successfully integrating, 20 companies a year could get more difficult the larger Cisco gets.



Michael Dell

Chairman and CEO, Dell Computer

Michael Dell has clearly crossed the line from PC maker to enterprise network vendor. He's been inching his company closer to that mark for the past several years with more enterprise-scale servers and storage systems. Today, sales of enterprise-class products and services total about half the company's revenue, and Dell is the sixth-largest supplier of storage worldwide, says market research firm IDC. His secret is, there isn't any secret. Dell practices what he preaches, and his company has long been held as a model of e-commerce and Internet integration.

George Conrades

Chairman and CEO, Akamai Technologies

George Conrades has the need for speed. One can see it in his work: running an Internet caching company that speeds some of the most popular sites on the Internet. One can see it in his play: as a motorcycle enthusiast who owns not just one bike, but a collection.

Still, Conrades is not your typical Internet start-up CEO. Underneath that motorcycle leather is a suave and witty man, a patrician network executive whose power lies not only in where he's at, but also in where he's been.

Today, he heads a leading Internet caching firm, with service deployed on 6,000 servers residing in 335 service provider networks in 54 countries. Akamai clients are among the hottest Web site operators, from CBS to Yahoo.

But Conrades is not content. Akamai has led scores of vendors in creating the Internet Content Adaptation Protocol to standardize the way corporate and ISP networks communicate with content delivery systems and ease content delivery to wireless devices. And the company has moved into streaming media for teleconference providers and managed storage services.

Still, Akamai was hit hard by the Internet stock correction. In January 2000, Akamai stock traded at an astounding $345 per share. Today, it hovers around $30 per share. Yet Conrades appears unworried, perhaps because revenue climbs quarterly even though the company hasn't posted a profit to date.

He's had to ride out tougher times. He's well known as an IBM fall guy who made good on the Internet. He ended a long career at IBM by taking the blame for the company's over-reliance on Big Iron. He then moved on to revive the dying BBN Planet and to orchestrate its sale to GTE, where he oversaw network operations. His next stint, as a venture capitalist for Polaris Venture Partners, led him to seed Akamai. If the past is indicative of the future, the network industry will feel Conrades' power for many years to come.

See **25 Most Powerful,** page 40

50 ON POWER'S EDGE

BY ANN SULLIVAN

Technology imitates life. Just a computers are linked to form a network, so are people linked to form industry. The Power 25 names the individuals who are the industry's core routers. They yield the most individual influence. Yet, they are n alone. Here are 50 others who, like network's major hubs, comprise th rest of the industry's power base.

Amazing analysts

Daniel Burrus
Founder and CEO,
Burrus Research Associates

More than 1,800 audiences have l tened to Burrus talk about new tecl nologies, detail creative applicatio and posit future effects. That's quit a wide reach for the technology forecaster, consultant and author of *Tec notrends*. Among the predictions Bur rus takes credit for is a 1984 call that the sequencing of the human gene code would occur by the end of the century. Officially, it happened abo six months into the new millennium but he was pretty darn close.

Geoffrey Moore
Managing director and founder,
The Chasm Group

What might Hewlett-Packard, IBM, Microsoft, Oracle and Sun possibly agree on? Moore's ability, appa ently. All were once clients of Moor a former English professor who has taught high-tech marketing to a generation of computer makers ove the past decade through his con sulting and writing. He's know as the Chasm Guy in some Sil con Valley circles, a referenc to Moore's signature metaphor and the title of his acclaimed book, *Crossing the Chasm*, which is about bridging the gap between two kinds of customers, the visionary and the pragmatist. His fourth book, *Living on the Fault Line: Managing for Shareholder Value in the Age of the Internet*, can out in August. It's aimed at old-economy executives faced with adjusting to the Internet Age.

Tom Nolle
President, CIMI Corp.

Vendors pay attention to Nolle because he's a straight talker with business acumen and a technical background that includes network design and packet-switch development. Regarding the coming year in networking, Nolle predicts a slowdown in network capital investment as service providers realize revenue doesn't justify massive infrastructure overhauls.

Enterprise paragons

Steve Chapery
Engineer, SiteSmith

Technical talent is scarce. Just ask Chapery. He posted his resume to an online job site, and 114 offers rolled i Last December he chose SiteSmith, provider of Internet infrastructure managed services. Now Chapery finds the tables turned as he tries to hire network engineers to help him run the 15 metropolitan networks he

bright outside.

CacheFlow Web Server Accelerator

"Our **focus** on content intelligent networking revealed a new, ground-breaking way to use caching–web server acceleration."

TIM REDJAIAN – DIRECTOR OF ENGINEERING

"Our specialized content **appliances** have the intelligence to simply plug in, adapt and work."

MONICA SARMIENTO – MANAGER, CUSTOMER SUPPORT

"Deploying Server Accelerators in front of the web farm is the first step in intelligently **distributing** content."

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Introducing the world's first
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Finally–an easy way to scale your web farm.
It's on-site, running 24/7, clocking 200 Mbps.

And because it knows how to speed up content...
Dynamic **content.**
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Faster-than-you've-ever-seen-it **content.**
Your rack has never looked better.

One Server Accelerator replaces five or more web servers. That means faster response time, happier customers, better scalability and optimized rack space.

It's easy–three settings and you're up.

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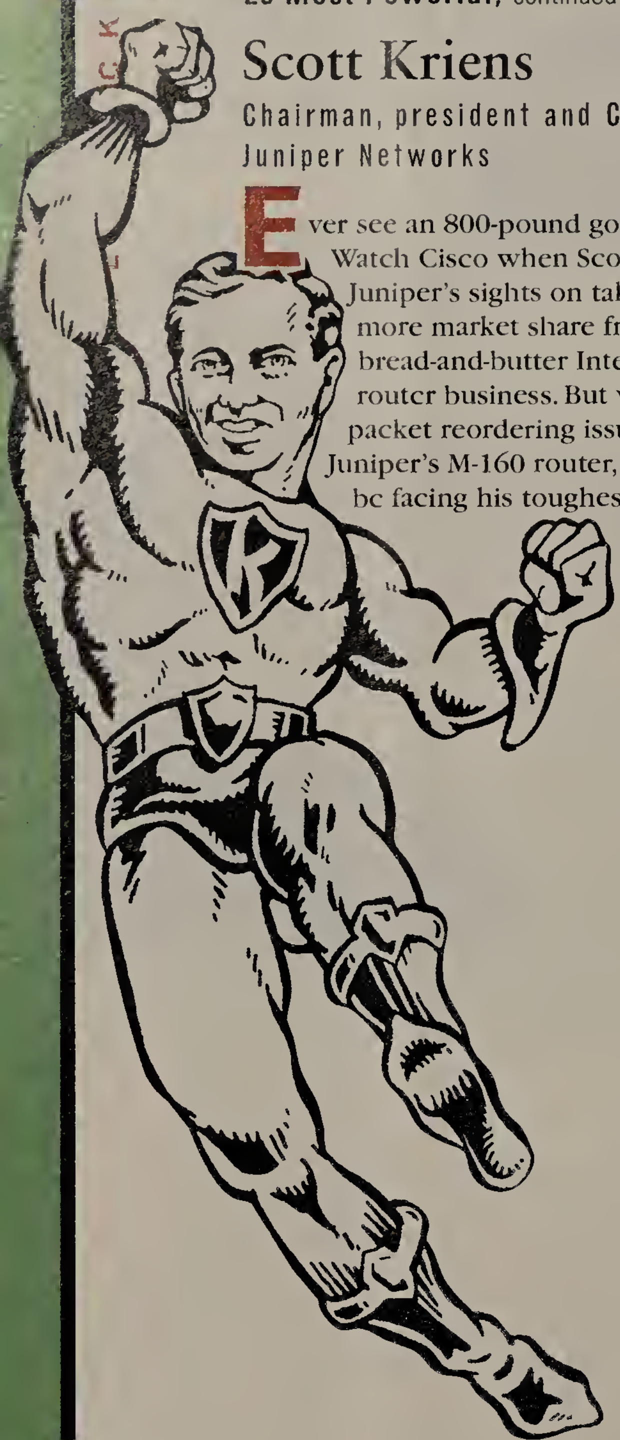
25 Most Powerful, continued from page 38



Scott Kriens

Chairman, president and CEO, Juniper Networks

Ever see an 800-pound gorilla sweat? Watch Cisco when Scott Kriens sets Juniper's sights on taking more and more market share from Cisco's bread-and-butter Internet core router business. But with the packet reordering issues of Juniper's M-160 router, Kriens may be facing his toughest test yet.

John Roth

President and CEO, Nortel Networks

John Roth is a soft-spoken, dignified man who lets Nortel Networks' actions speak louder than his words.

When the company bought Bay Networks more than two years ago, he said that acquisition began Nortel's transformation into an IP company. That didn't quite happen, as Nortel lost a dramatic share of the Layer 3 switch market and killed its much-anticipated IP router for the Internet core.

No matter. The Bay deal infused Nortel with an entrepreneurial spirit not found in 100-year-old telephone equipment companies. Nortel's value has been skyrocketing ever since, thanks to Roth's stealthy focus and execution in optical and wireless networking. The company's market cap has ballooned to nearly $200 billion.

Roth's steely determination to lead in these markets is evident in several moves he orchestrated this year. Nortel bought optical switch maker Xros in a stock deal worth $3.25 billion; picked up optical component manufacturer CoreTek for $1.43 billion; and invested $260 million in its own optical networking and components business. That investment will create 34,000 jobs.

Teddy Roosevelt said speak softly but carry a big stick. Roth is tweaking that to talk softly and carry a big stick.

Michael Ruettgers CEO, EMC

Mike Ruettgers has a gift for transformation. He's not only transformed EMC into the dominant networked storage company in the industry and a household word, but he's also helped transform networked storage from a dull, dowdy niche into one of the sexier industry markets.

Under Ruettgers' leadership, EMC has helped the industry recognize storage as more than just a passive container of enterprise data. It's now looked at as the bedrock of a company's e-business operations.

This will only become more important as efforts to meld storage-area networks (SAN) to IP take hold and optical SANs pervade the industry. Ruettgers is leading the EMC charge on both fronts.

He's also leading EMC into bigger and better things. Since Ruettgers took the helm in 1991, EMC revenue has grown more than 50-fold, to $6.7 billion in 1999, with net income exceeding $1 billion. Between 1997 and 1999, EMC's annual revenue more than doubled.

EMC's fortunes under Ruettgers' care have not gone unrecognized. In 1998, *BusinessWeek* named Ruettgers one of the "World's Top 25 Executives." *Fortune*, in its 1999 list of "The World's Most Admired Companies," ranked EMC No. 3 in the computer industry. And EMC this year makes *Network World's* "10 most powerful companies" list (see story, page 11).

Hardly surprising for the son of an Air Force pilot, who includes hunting and military history among his passions. As proof of his passion for fight, one of his prized possessions is a poster of himself holding up a fist with blue-stained knuckles, taunting IBM: "Had enough, Big Blue?"

IBM may cry uncle soon. Ruettgers' goal is to double EMC's size again to $12 billion in 2001. Sounds like EMC's transformation is just beginning.

See **25 Most Powerful**, page 42

created and maintains. Chapery says he chose SiteSmith to build a really big network that would be his "own baby." With unemployment at 4% and thousands of tech jobs going unfilled, IT professionals such as Chapery can command great salaries and a bevy of perks. Power to the people.

Robert DeRodes
CIO, Delta Air Lines; president and CEO, Delta Technology

DeRodes is a pretty popular guy among employees, customers and Atlanta's charitable organizations. Delta's 74,000 U.S. employees are grateful to him for letting them buy new computers with Internet and intranet access for as little as $12 per month for 36 months. This is thanks to the airline's new Wired Workforce initiative with PeoplePC.

With Delta's IS subsidiary, DeRodes has made passengers' lives easier, too. They can now select seats online, print boarding passes from airport kiosks and confirm departure times on handheld devices.

And the Atlanta charities? The chief information officer pulled in top dollar at a fundraising auction — Computer Associates bid $15,400 for lunch with DeRodes. He commanded the highest bid among the executives who participated in the auction.

Bill Friel
Senior vice president and CIO, Prudential Insurance Company of America

Friel has network smarts, and he shares them liberally. He leads Prudential's technology initiatives, from creating its 900-site WAN to implementing e-commerce sites for Prudential's business units. Outside Prudential, Friel sits on advisory boards at IBM, Intel and Microsoft, making him something of a spokesman for CIOs everywhere. Not shy of the spotlight, Friel has frequently lent his perspective to many publications — and countless readers — during his 40 years in IT.

Joshua Levine
CTO, E-Trade

Levine joined E-Trade in the fall of 1999, where he's now referred to as "the guy who keeps the wheels rolling around the world." Previously, Levine held top technology posts at Deutsche Bank and Morgan Stanley.

Gary Reiner
Senior vice president and CIO, General Electric

Reiner is in charge of GE's overall 'Net strategy. That's no small task considering the diversity of GE's units: aircraft engines, refrigerators, credit cards and power generators, for example. When Chairman Jack Welch said he wanted century-old GE turned into an e-commerce competitor, this former Boston Consulting Group partner responded. Today, the company's successes include reverse auctions through which suppliers bid for GE's business and online customer service that costs a fraction of telephone support. Reiner is also the chairman of GE Information Services, a wholly owned IT services subsidiary best known for managing GE's e-marketplace, GE Global eXchange, and for its e-business integration offerings.

Bernard Rostker
Undersecretary of Defense for Personnel and Readiness, U.S. Department of Defense

A new Web site for the military —

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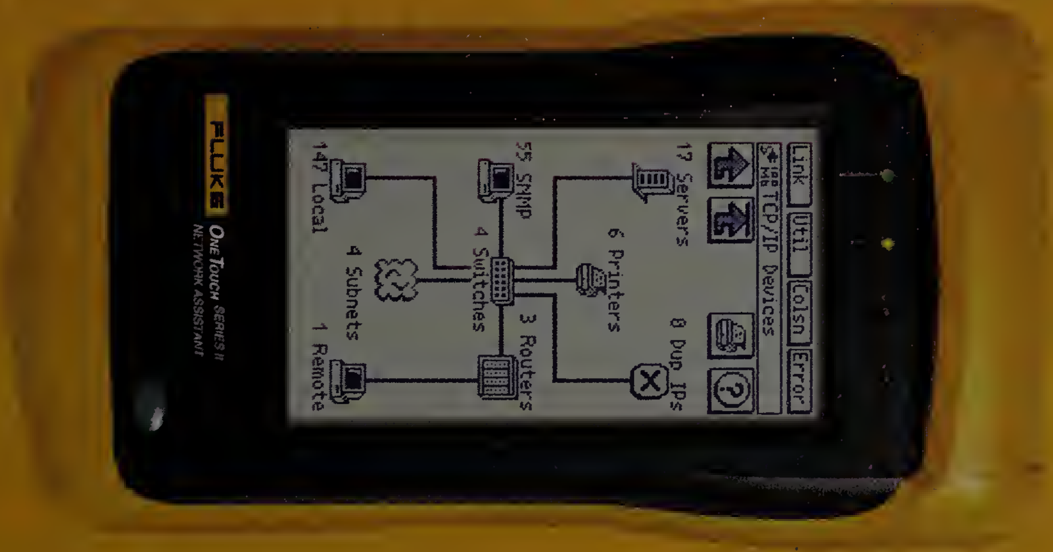

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FLUKE networks

25 Most Powerful, continued from page 40

Carl Yankowski

CEO, Palm

A keen knack for consumer marketing is what makes Carl Yankowski a power player this year.

Few argue that the Palm will become the next cell phone. Just as you see — and are annoyed by — people chatting on cell phones every hour of every day in every place, so too will you see — and be bothered by — people accessing the 'Net via their Palms.

For the development of the ultimate handheld consumer and business tool, Palm enlisted the consummate consumer products executive. Yankowski was president and CEO of Reebok when 3Com tapped him a year ago to lead Palm.

Before that, Yankowski was president and chief operating officer of Sony Electronics. He's also held various positions at General Electric, Memorex and Polaroid over the past 25 years. Under his guidance, Sony was named the most respected brand name in America in 1995 and 1997.

But for all his marketing successes, Yankowski wants to be known more for his technical savvy and precision. He believes that in order to market a product successfully, you have to get your hands mucky in its technical guts.

That may explain why Yankowski enjoys dabbling in gadgetry, including ham radios, 22 or so Sony products that he's got at home and the control panel of a plane. It's Yankowski's push for precision that will likely make Palm one of the most respected brand names in networking, and his own name one to remember.

Software superheroes

Steve Ballmer

President and CEO, Microsoft

No one will ever accuse Steve Ballmer of mincing words. The outspoken Microsoft CEO confidently — while perhaps wrongly — predicted that Microsoft would emerge intact following the Department of Justice's ruling on whether the company abused its operating system market position to snuff out competition.

Not shy about defending Microsoft's software pricing and licensing practices, Ballmer insists the company will not alter its modus operandi regardless of federal antitrust findings. He also lambastes industry executives, such as Sun CEO Scott McNealy, when they trivialize the role of software in computing and networking.

Software, Ballmer says, is the industry's future. Would you expect anything less bullish from a multibillionaire honcho at the world's largest software company who grew up in Detroit, among the blue-collar environs of Ford Motor Co.?

Ballmer's passion and leadership have become hallmarks of his tenure at Microsoft, and his energetic discipline and spirit have been infectious, Microsoft says. That's good, because spunk will be needed as Microsoft embarks on its most comprehensive reinvention in the company's 25 years. Ballmer will help lead Microsoft's ambitious development of .Net, a distributed computing architecture that puts a unified face on a variety of digital devices.

His enthusiasm, passion and outspoken determination add up to powerful ingredients that will be vital if Microsoft is to succeed in this reinvention.

See **25 Most Powerful**, page 44

www.todaysmilitary.com — tells the story of a recruiting strategy that's changing with the times. This Senate-confirmed presidential appointee is one of the people behind the Web site, as well as a new initiative to develop recruiting stations in shopping malls that have a "gee-whiz, high-tech" feel, Rostker says. What's next? Smart cards for Defense Department active duty members and reservists, as well as select civilian employees and contractors. The smart cards initially will provide access to building and computer systems, and eventually could enable digital signatures and e-commerce transactions.

Infrastructure **bedrocks**

Craig Barrett
President and CEO, Intel

Today's Intel is about more than processors, thanks to Barrett's diversification campaign and push into the enterprise with backbone switches, remote-access products and Web hosting. From his Montana ranch, Barrett weathered summer wildfires, and from his fifth-floor cubicle, he weathered the August recall of the 1.13-GHz desktop Pentium III processor. An avid hiker — he met his wife atop Arizona's Squaw Peak — Barrett always takes the stairs.

Jim Balsillie
Chairman and co-CEO, Research in Motion

Basillie once described himself and co-CEO Mike Lazaridis as "type A quadruple plus." That energy helped the pair attract a cult-like following to their always-on BlackBerry wireless e-mail devices. No Silicon Valley flash-in-the-pan start-up, Research in Motion (RIM) was founded in 1984 and is a star player in Canada's IT industry. Basillie hasn't let RIM's rapid growth and BlackBerry's international success go to his head, however. He still lives in the house he was married in and drives the car he owned six years ago.

Robert Bernard
Chairman and CEO, MarchFirst

He's written plays and designed homes, and he owns a dog biscuit bakery in Chicago's trendy Lincoln Park neighborhood. But can Bernard turn things around at MarchFirst, the cash-poor Internet and technology company created by the merger of Whittman-Hart and USWeb/CKS? One year into the merger, the consulting company faces off-the-mark earnings, plummeting stock prices and layoffs. Investment company Francisco Partners committed to a $150 million cash-for-stock deal in December after MarchFirst told the Securities and Exchange Commission it needed $100 million to stay afloat.

Carly Fiorina
Chairman and CEO, Hewlett-Packard

The honeymoon may be over for Fiorina, after Hewlett-Packard's poor fourth-quarter 2000 showing and canceled PricewaterhouseCoopers deal. But don't expect this leader to give up on the marriage. Her intention is to build HP's services arm and grow new markets such as wireless devices. The highest paid woman executive in Silicon Valley, according to the *San Jose Mercury News*, Fiorina is under heavy pressure to make good.

Bobby Johnson
President and CEO, Foundry Networks

Johnson is a student of military history and strategy who appears to have declared war against Foundry's greatest competitor in the LAN and

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When critical data and operations are on the line, you can't take chances with a power grid that fails an average of eight hours a year. Powerware has been protecting mission-critical operations for more than 37 years. That same expertise goes into our entire line of hardware, software and service.

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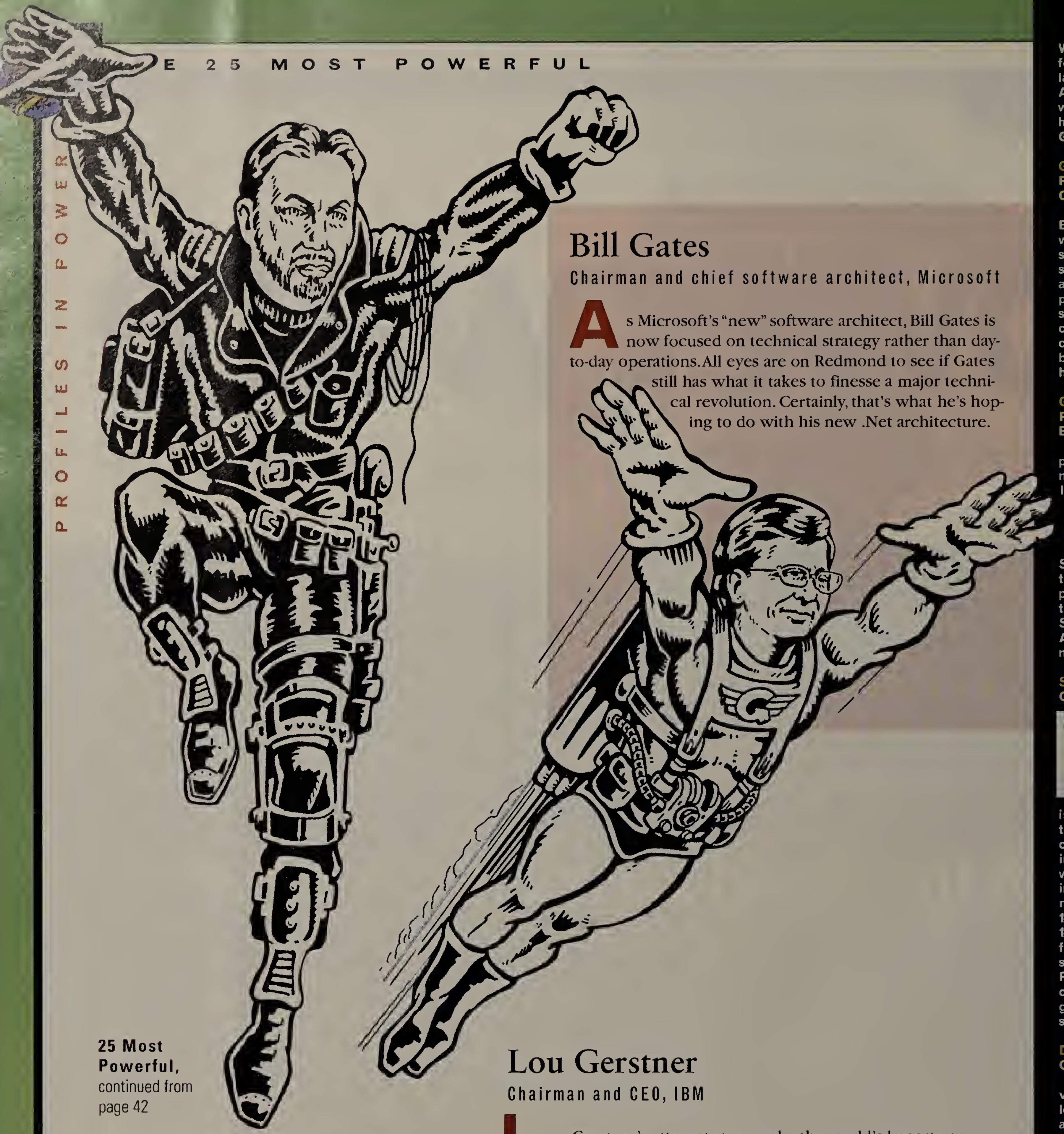

Bill Gates

Chairman and chief software architect, Microsoft

As Microsoft's "new" software architect, Bill Gates is now focused on technical strategy rather than day-to-day operations. All eyes are on Redmond to see if Gates still has what it takes to finesse a major technical revolution. Certainly, that's what he's hoping to do with his new .Net architecture.

Lou Gerstner

Chairman and CEO, IBM

Lou Gerstner's attempts to remake the world's largest computer company into an Internet powerhouse appear to be paying off. Pundits herald IBM's e-business initiatives, and competitors attempt to emulate them.

See **25 Most Powerful**, page 46

25 Most Powerful, continued from page 42

Larry Ellison

Chairman and CEO, Oracle

No matter how you define power, Larry Ellison's got it. He's rich, famous and successful. Is he also flamboyant? Sure. Egotistical? You bet. But Oracle remains a model of how a technology company should prosper in any economy, new or old; it's making money and lots of it.

Oracles owns more than 40% of the database market, and its revenue and profits grow heavily quarter after quarter, year after year. Sure, the recent departures of two of Oracle's brightest management stars, Ray Lane and Gary Bloom, is evidence of Ellison the tyrant. But when push comes to shove, Oracle isn't just the database of the Internet, it's the right ventricle of e-commerce. This after being the left ventricle of client/server computing.

Ellison founded Oracle and controls its every move. The credit is his.

WAN switch market: Cisco. Revenue for third-quarter 2000 grew 191% over last year's third-quarter revenue. Among its new business is a deal with Yahoo that enlists Foundry's hardware to work the Web site's GeoCities Web community.

Greg Reyes
President and CEO, Brocade Communications Systems

Fibre Channel is the lifeblood of Brocade, maker of switches, software and services for connecting storage devices and servers through storage-area networks (SAN). An advocate of interoperable SAN products and standards-driven infrastructure, Reyes is the envy of dot-com casualties: A Brocade stock climb from the $50 range in December 1999 to $267 in October 2000 made him a billionaire.

Gordon Stitt
President, CEO and chairman, Extreme Networks

Gigabit Ethernet evangelist Stitt preached his "Ethernet everywhere" mantra in 2000, and folks seem to be listening: Extreme is in the lead for overall Layer 3 switch port shipments, with 30% of the market as of September 2000, according to market research firm Dell'Oro Group. Stitt sees Ethernet extending beyond the corporate LAN and into metropolitan-area networks as an alternative data-transport technology to SONET; the company rolled out its Alpine and Summit switches to make that happen.

Serge Tchuruk
Chairman and CEO, Alcatel

Purging its non-telecom units — including a winery in France — and buying equipment vendors such as Xylan and Newbridge Networks is part of Tchuruk's grand plan to transform the European voice gear company into a global giant. Going into 2001, 100% of Alcatel's business will be telecom related, Tchuruk said in November. Alcatel's telecom business went from 39% of total sales in 1995 to 85% in 1999 to an expected 100% in 2000. In addition to a high-profile buying spree, Tchuruk has made some significant changes inside the French firm: He made English the company's official business language, and he introduced U.S.-style stock options companywide.

Dan Warmenhoven
CEO, Network Appliance

David to Goliath EMC, storage vendor Network Appliance is the leader in the network-attached storage market, an alternative to high-end storage systems. Creating a new market segment is among Warmenhoven's proudest accomplishments, he says. Not content with small and midsize Web warehousing, Warmenhoven, yet another former IBMer doing well as lead banana, is making a play for the enterprise market with storage appliances that can scale to 12 terabytes.

Security stars

Bill Larson
Chairman and CEO, Network Associates

Network Associates is on the rebound, and Larson is leading the charge. After a dismal performance in 1999 that left the company $50 million in the hole, Network Associates today is building on its core products — antivirus software and services, network sniffers and PGP encryption software — and adding products for the Internet, wireless and broadband to the mix. At the end of 1999, Larson led the reorganization of Network Associ-

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The promise of e-business is every bit as robust today as it was when the "new economy" was declared. It's just that things that were labeled passé, like planning, infrastructure and profitability, have returned with a vengeance. Welcome to the new "new economy." No company is better suited for this new world of value-oriented e-business than SAP, with our supply chain, collaboration and customer relationship solutions. Out with the "new." In with the "new new." Learn more, type in www.sap.com

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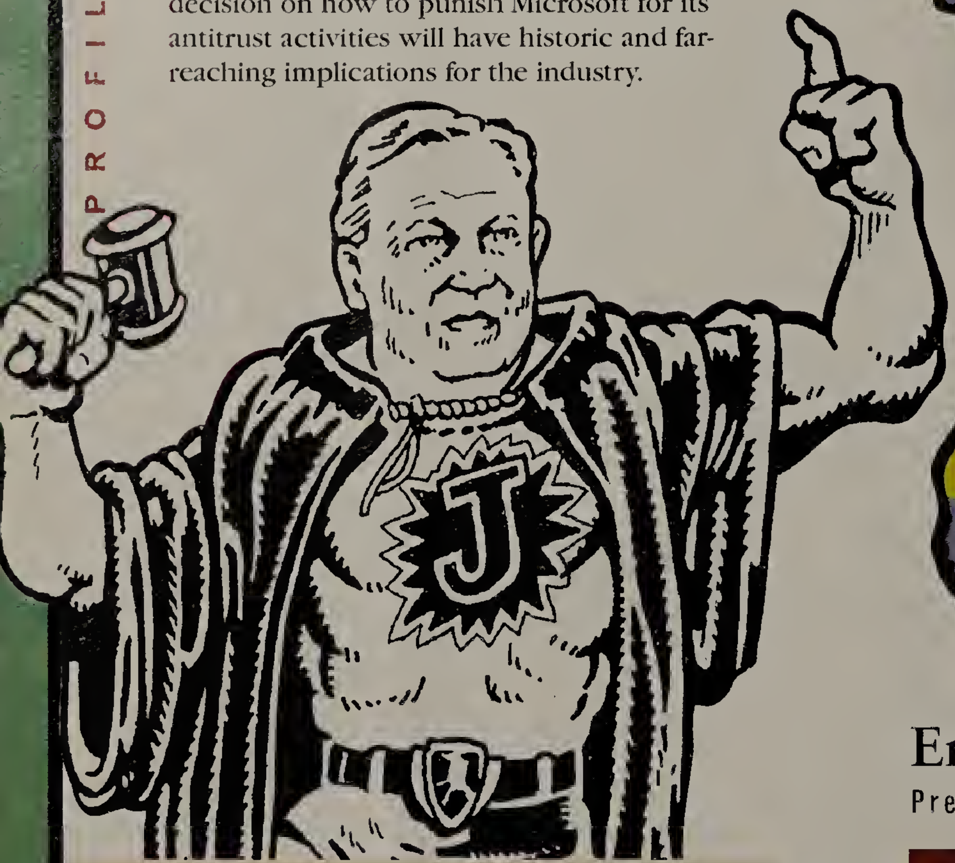
25 Most Powerful, continued from page 44

Thomas Penfield Jackson

U.S. District Judge,
U.S. District Court for the District of Columbia

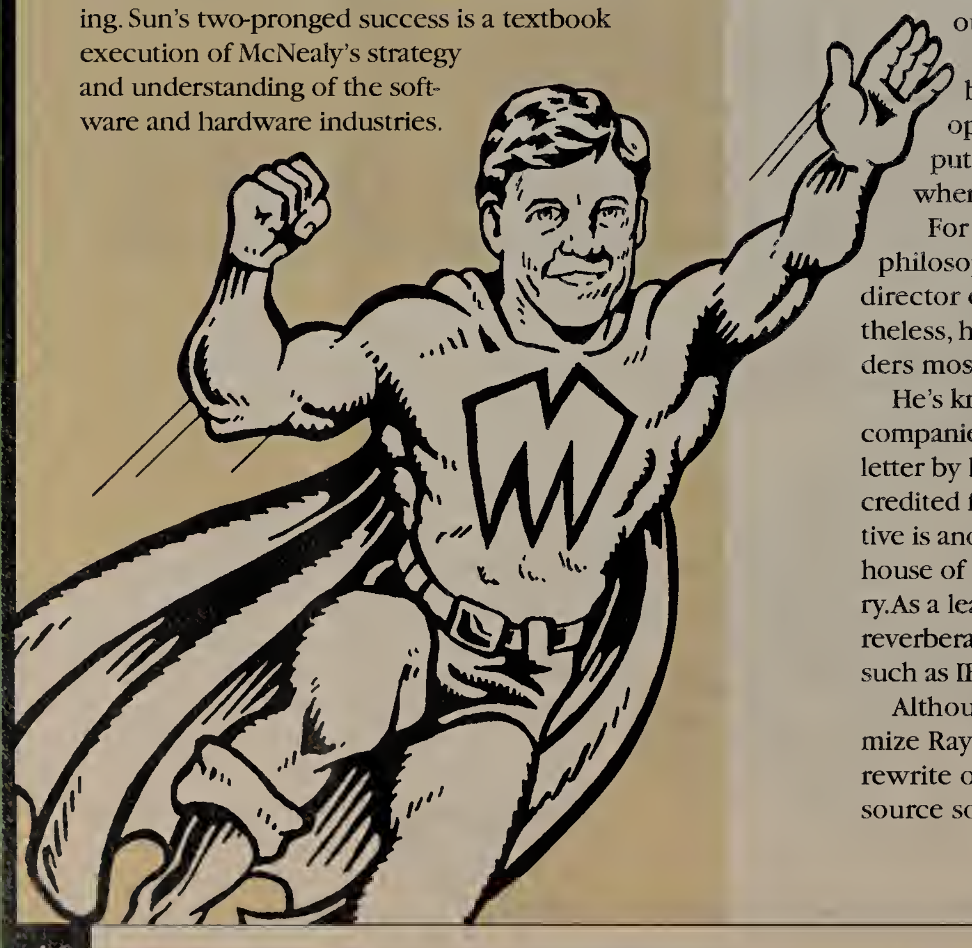
Granted, Microsoft might not consider Judge Thomas Penfield Jackson a hero, but the rest of the software industry just might. One thing's for sure — he's the only person who scares Microsoft Chairman Bill Gates more than Sun CEO Scott McNealy. His decision on how to punish Microsoft for its antitrust activities will have historic and far-reaching implications for the industry.



Scott McNealy

Chairman and CEO, Sun

Scott McNealy's outspoken vision and focus are two reasons why Sun is considered one of the few major threats to Microsoft's software dominance. In hardware, Sun servers are the de facto standard for Internet Web hosting. Sun's two-pronged success is a textbook execution of McNealy's strategy and understanding of the software and hardware industries.



Eric Raymond

President, Open Source Initiative

Eric Raymond is an almost unwilling member of the networking power elite. A quintessential Unix techie with a huge sense of humor and a black belt in tae kwon do, he considers himself an anthropologist of the Internet hacker culture — hacker, of course, in its politically correct, disinfected definition, meaning those who are good at programming.

His voluminous writings on the topic bear that out. He's published the hilarious *New Hacker's Dictionary* and *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary.* The latter is an essay collection outlining his theory on open source code. It includes the famous essay that inspired Netscape to make its browser open source. In a nutshell, the theory is that open source software is better for the Internet because it puts the power of interconnected minds to work. That is, when developers are allowed to toy with code, they do.

For Raymond, open source software remains more of a philosophy than a business strategy, although he is now a director of for-profit open source poster child VA Linux. Nevertheless, he says Linux evangelism is a full-time job, and he renders most of his speaking engagements for free.

He's known for exposing open source hypocrisy at vendor companies, particularly Microsoft and Hewlett-Packard. A sharp letter by him to HP's CEO Carly Fiorina, penned in October, is credited for HP's beefed-up Linux efforts. The Open Source Initiative is another of his evangelism platforms. It serves as a clearinghouse of Linux information, code and open source business theory. As a leader of this grass-roots movement, Raymond's power reverberations have been felt throughout 2000, as heavy hitters such as IBM and Sun began supporting Linux on their servers.

Although he's an inspiring spokesman, that shouldn't minimize Raymond's technical accomplishments, which include a rewrite of the Usenet netnews software and volumes of open source software. He remains a programmer at heart.

ates into six divisions, and recent earnings statements seem to validate the decision. In October, the company reported earnings of 27 cents per share, 3 cents above analysts' projections and 108% better than the 13 cents it earned for the same quarter in '99.

Elias Levy
Chief technology officer, SecurityFocus.com

Wondering what evil viruses and software vulnerabilities are waiting to trip up your network? Levy already knows. He's responsible for site operations at San Mateo, Calif., security firm SecurityFocus.com and moderator of BugTraq, a security mailing list with 27,000 subscribers. "Aleph One," his BugTraq moniker, monitors submissions and keeps things professional in the discussion chains.

John Ryan
President and CEO, Entrust Technologies

Ryan is the self-proclaimed Entrust foosball champion — though it's rumored the employees let him win. One title he can legitimately claim for his company is leader in the public-key infrastructure (PKI) market. Giga Information Group ranks Entrust first among PKI vendors by revenue and said it expects the company to remain on top for several more years.

Service provider bravos

Johnson Agogbua
Co-founder, vice president of engineering, BroadBand Office

BroadBand Office (BBO) aims to deliver one-stop shopping for applications, connectivity and voice services to office building tenants. BBO is affiliated with 80 real estate companies, which will help pave the way for the on-site carrier's skyscraper conquests.

Agogbua oversees product development, integration and the infrastructure build-out of BBO's network and application services. A chance to work with the former head of global infrastructure services at UUNET was a big draw for many BBO recruits, as was the monetary support of company founder Kleiner, Perkins, Caufield & Byers. The money didn't stop there. In early 2000, oft adversaries Microsoft and Sun invested $25 million apiece in BBO.

William Esrey
Chairman and CEO, Sprint

Despite the failed marriage with WorldCom, Esrey has so far bucked the restructuring trend that AT&T and WorldCom are riding. Like its rivals, Sprint is trying to shift its focus from the shrinking voice market to high-growth data and Internet services. To that end, Esrey is overseeing the rollout of a wireless broadband service that provides an alternative to DSL and cable modems. The service will launch in 30 markets by the end of 2001. Esrey also deserves notice as the longest-serving chief executive in the telecom industry with 20 years at Sprint, 15 of them as CEO.

David Oros
Founder, chairman and CEO, Aether Systems

Oros is said to have an infectious enthusiasm and sense of urgency that has everyone around him trying to keep up. He is as fast moving as his company, which saw revenue grow from $1.5 million in third-quarter 1999 to $16.2 million in third-quarter 2000. Aether offers a range of products to support the wireless Web, from development kits to reformat Web pages for tiny screens to full wireless Web-hosting services.

Jerry Parrick
CEO, Yipes Communications

Parrick is no stranger to start-ups.

His first venture after college was a campaign consulting business he founded in California. Between July 1999 and October 2000, a healthy chunk of venture capital dollars — $230 million, to be exact — landed in the coffers of Yipes, the San Francisco start-up Parrick runs. Why all the attention? Parrick and his team are offering service provider clients bandwidth on demand via the company's optical IP network. So far, service is available in 17 U.S. markets.

Barry Schuler
President of Interactive Services, AOL

Onetime photographer and graphic designer, Schuler handles AOL's flagship AOL service, as well as AOL Anywhere, the initiative to bring chat and interactive features to devices such as wireless phones and TVs. He believes consumers are just getting started with the 'Net and predicts a second revolution of home networks, wireless connectivity and broadband access. He plans to have AOL's instant messaging products interoperable with competing IM products in 2001.

Denny Strigl
President and CEO, Verizon Wireless

It's not hard to quantify Strigl's power: His company is the largest wireless communications carrier in the U.S. His customers number more than 25 million for wireless voice and data, and four million for paging. His coast-to-coast kingdom extends to 96 of the top 100 U.S. markets. His challenge? Integrating the wireless operations of Bell Atlantic, GTE and Vodafone AirTouch.

Software saviors

Shawn Fanning
Founder, Napster

Nicknamed Napster in high school, Fanning authored the music file-sharing program that has since been downloaded by more than 35 million people. Athletic, focused and disciplined, the kid who rocked the music industry is now a cultural icon who has appeared on the covers of *Forbes, Fortune* and *BusinessWeek*. Among the perks of publicity? Opportunity. Onetime enemy Bertelsmann, a huge German record company, and Napster are forming an alliance to develop a peer-to-peer file-sharing service.

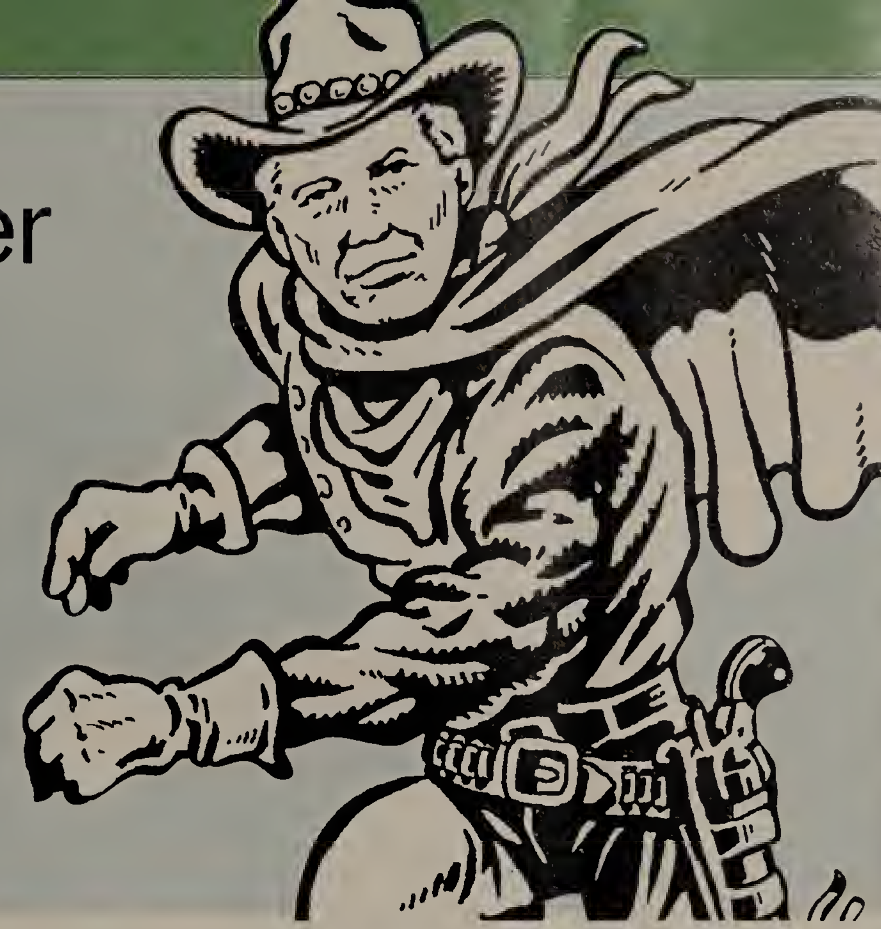
Mark Hoffman
Chairman and CEO, Commerce One

What do West Point, Sybase and Commerce One have in common? Hoffman. He shook up the relational database world in the 1980s with SQL Server, the flagship product of Sybase, a company Hoffman co-founded in 1984 and led for 12 years. He hopes to do the same with online business-to-business exchanges. Commerce One partnered with SAP in June to develop e-commerce technology — and to counter a similar move by rival Ariba to partner with IBM and i2 Technologies. Hoffman, who originally aimed to be a biology teacher, predicted the rise of 'Net trading hubs three years ago. His company's track record validates his prediction: Commerce One went from $2.6 million in revenue in 1998 to $33.6 million in 1999, and a projected $383 million in 2000.

Keith Krach
Chairman and CEO, Ariba

Krach is a risk-taker, and his company's corporate culture encourages employees to do the same. Krach's risk has paid off: More than 100 marketplaces are powered by Ariba's business-to-business e-commerce platform, and Ariba is expected to lead e-commerce software sales in

Service provider **commandos**



C. Michael Armstrong

Chairman and CEO, AT&T

AT&T certainly hasn't had the year C. Michael Armstrong had hoped it would in 2000, especially as a faltering voice business dragged its financials into the doldrums. His bold plan to break up AT&T will have radical implications for the telecom giant — and its customers.

Steve Case

Chairman and CEO, AOL

As 2000 dawned, Steve Case rocked the business world with his deal to buy Time Warner. The implications of this marriage between service and content provider are still being chewed over as the merger proposal slowly moves through regulatory review. The European Union has given a tentative nod, and shareholders have approved. Confident of the final outcome, the new company announced its executive cast of characters, with Case landing as chairman and Gerald Levin, Time Warner's head honcho, as new CEO. Case's aggressive acquisitions have earned him the fiefdom of the ISP world. Should he realize this next vision, he'll be the emperor of a new breed of service provider.

Bernie Ebbers

President and CEO, WorldCom

So the failed merger with Sprint is a bitter taste that fades slowly for Bernie Ebbers. WorldCom has now distanced itself so thoroughly from MCI that the two are again separate operating companies. Ebbers remains the leader of it all and a power to reckon with. His kludged datacom kingdom competes with every other service provider around, and although beaten by the politics of regulators once, he's back on the merger warpath with the intended acquisition of Intermedia Communications for its Web-hosting company, Digex.

Ellen Hancock

Chairwoman and CEO, Exodus Communications

In the 1980s, Ellen Hancock was networking at IBM. She remains about as well known for her 29 years at Big Blue as she is for her skyrocketing Web hosting start-up, Exodus Communications. Those years led her to the inner circle of IBM and a mouthful of a title: senior vice president and group president of the Networking Hardware, Networking Software and Software Solutions divisions. But her star fell with the changing of the IBM guard from John Akers to Lou Gerstner, when she was ousted and blamed for IBM's failure to grasp massive change in the networking industry.

After go-nowhere stints in leadership roles at National Semiconductor and Apple, the latter ending in a job-ending run-in with Steve Jobs, she landed as CEO of Exodus in 1998. Hancock spied an enterprise market, and now the company is on track to bill out more than $1 billion per year, mostly to companies with complex hosting needs.

Hancock's laughing all the way to the bank. Not only is she featured on all the who's who lists magazines like to publish, but as of last summer, she ranked No. 51 on a list of the highest-paid executives in Silicon Valley. That put her at No. 4 for highest-paid women, according to the *San Jose Mercury News.*

As for Exodus, the tough, ambitious Hancock doesn't see a company, she sees an empire. Her goal is to become the most powerful woman in computing, she pledged in a recent *BusinessWeek* article.

As evidence that she's on her way, she orchestrated the $6.5 billion acquisition of competitor GlobalCenter. Exodus gets 32 data centers and is positioned to sell higher margin managed services to a new slew of Web hosting customers.

For Hancock, Exodus has meant a second arrival among the network industry's powerful.

Ivan Seidenberg

President and co-CEO, Verizon

Ivan Seidenberg holds one of the more interesting job-sharing positions a company ever invented: the co-CEO slot of a telecom behemoth. That giant would be Verizon, which sprung to life in 2000 as a Fortune 10 company from the merger of Bell Atlantic and GTE. Seidenberg, former head of Bell Atlantic, will share the CEO office with Charles Lee, GTE's former CEO and Verizon chairman, until 2002. Then, it's all his baby.

Seidenberg clearly thinks bigger is better. He has now navigated through three major telecom mergers: Bell Atlantic with Nynex; Bell Atlantic with GTE; and the wireless divisions of Bell Atlantic and GTE with Vodafone AirTouch. That's quite an empire for a man who began his career three decades ago as a cable splicer's assistant.

Seidenberg's ultimate goal is to form a conglomerate that matches the largest competitors, something neither Bell Atlantic nor GTE could hope to achieve before they merged. With 63 million voice lines, 26 million wireless customers and operations in 21 countries, Verizon can take on the AT&T/TCI/MediaOne cartel, the SBC Communications/Pacific Bell/Ameritech combo and the WorldCom/MCI duo.

Seidenberg fancies himself a businessman and an activist. The objects of his political attentions are education and diversity. He serves on the boards of The New York Hall of Science, the National Urban League and Pace University, from which he received his master's degree.

In the past year, he's spoken about racial diversity in the workforce to the U.S. Hispanic Chamber of Commerce (USHCC) and The Rainbow/PUSH Coalition, an organization led by the Rev. Jesse Jackson and involving leaders on Wall Street and in the White House. Seidenberg announced a $10 million investment for a venture capital fund to be given to Hispanic-run start-ups and managed by the USHCC.

Likewise, Seidenberg has promised more jobs to minorities and $200 million to be spent with Hispanic vendors. This doesn't include the works of the Verizon Foundation, which doles out hefty grants to worthy causes.

See **25 Most Powerful**, page 50

2000 with 9% of the market, according to AMR Research. Among the company's 2000 highlights is an alliance with IBM and i2 Technologies.

Bob Muglia
Group vice president of .Net Services Group, Microsoft

Muglia is the guy directly responsible for .Net, Microsoft's new Internet-based services effort. He oversees development of software, subscription services and interface design. Before .Net, Muglia was vice president of the division responsible for Microsoft Office. Whether Muglia and company can weave Windows' legacy in with future .Net initiatives remains to be seen.

Ray Ozzie
Founder, chairman and CEO, Groove Networks

Lotus Notes creator Ozzie had no trouble getting the industry's attention for his latest venture, even after three years in hiding. All eyes were watching as he unveiled Groove Networks' collaborative software products in October. The start-up had been operating in stealth mode for three years, developing a peer-to-peer client for sharing applications and files.

Eric Schmidt
CEO, Novell

Novell is in a pickle. Poor financials, layoffs and restructuring combined to make 2000 a tough year for head honcho Schmidt. Can the personable techie turn things around? Novell's fiscal year 2000 earnings were disappointing — net earnings dropped almost fourfold, to $49 million from $191 million a year ago.

If only he could apply his fund-raising talents to his own company. Schmidt hosted a dinner at his Atherton, Calif., home in September that reaped $3 million for the Democrats. It was attended by about 300 high-tech executives, Vice President Al Gore, actors Robin Williams and Sharon Stone, and featured Elton John on the piano.

For the loyalty users still feel for Novell, Schmidt hangs onto his power slot by a thread.

James Tauber
Director of XML technology, Bowstreet

His is not a typical title found on a list of power elite, nor is the job all that typical. Bowstreet provides infrastructure for business-to-business Web marketplaces, and that infrastructure is based on XML.

Enter Tauber. He keeps Bowstreet employees and clients who use the Internet community up to date on all they need to know about XML. Bowstreet isn't the only recipient of Tauber's expertise — on his own, Tauber maintains XMLinfo.com, a Web site dedicated to all things XML, including specs, applications and training.

Carrier infrastructure czars

Wu-Fu Chen
Entrepreneur

What's Chen done? Pretty much the industry from A to Z. The 10th child of Taiwanese farmers, Chen has founded or helped launch 11 networking companies, including Anda Networks, Ardent Communications, Arris Networks, Cameo Communications, Cascade Communications, Cinta Corp., Geyser Networks, OptiMight Communications, SanCom Corp., Santera Systems, Shasta Networks and Zettacom. Some are new, some have changed hands. They're not all blockbusters, but he's certainly had his share. Chen isn't one to

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25 Most Powerful, continued from page 48

Joe Nacchio

Chairman and CEO,
Qwest Communications

With the purchase of US West final as of June, Joe Nacchio can't make a long-distance call from his Denver office on his own long-distance network. But so what? He's turned Qwest into a New Age, Web-hosting version of his corporate alma mater, AT&T. With that, he's moved his attention from the western U.S. to the world. In the past six months, a string of announcements laud Qwest's international conquests. They include agreements touching Europe, Mexico and Japan. Nacchio, who came to the fledgling Qwest in 1997, has taken it from start-up to international contender in less than three years.

Ed Whitacre

Chairman and CEO, SBC Communications

Called "the last monopolist" by *BusinessWeek*, Ed Whitacre in many ways is cast in the image of the great 19th century industrialists. He's a straight-speaking — albeit in a Texas drawl — no-nonsense man who eschews company meetings and thrives on besting his competition.

Known for casually killing rattlesnakes on his Texas ranch with a swift smack of a stick, Whitacre pursues business goals with that same Wild West tenacity. In February 2000, the Department of Justice dealt what seemed like a deathblow to SBC's long-distance hopes: It recommended that the company be blocked from that business. Yet in July, the Federal Communications Commission acquiesced and approved SBC for long-distance offerings in Texas. By October, SBC had grabbed about one million long-distance customers and applied for approval in Kansas and Oklahoma.

Chalk up another win for Whitacre, whose vision is to grow SBC to dizzying heights in the number of phone lines the company owns and the variety of services it offers over those lines.

Still, one can't be a telecom giant without critics. In his takeovers of other phone companies, Whitacre has been characterized as a raiding Texan. Managers at acquired regional Bell operating companies in faraway places such as California and the Midwest have complained that they retain little power. Whitacre prefers to keep it to himself and his good-old-boy oligarchy. This has created ill will toward him in his far-flung empire, which includes interests in 23 countries.

Such animosity is not helped by the company's inability to meet demands for its business data services. In October, more than a year after SBC's takeover of Ameritech, Whitacre apologized publicly to state regulators for SBC's mounting order backlogs and customer complaints.

But Wall Street loves him. SBC rose from No. 35 to No. 12 on the 2000 Fortune 500 list and from No. 9 to No. 3 on the *Network World* 200 list.

remain idle; the longest he's stayed at any one company is one year.

John McQuillan
President, McQuillan Ventures

Well-respected and intelligent, McQuillan has a good gig going, and he knows it. This consultant-turned-venture capitalist evaluates and funds new businesses in broadband networking. Complementing the venture capital work is his events forum. McQuillan founded and chairs the annual Next Generation Networks and NGN Ventures conferences, where emerging technology firms take the floor. McQuillan cashed in on his first event series, the ATM Year conferences, in 1997 as that technology's prominence waned.

Greg Mumford
President of Optical Networks, Nortel Networks

The optical lead is Nortel's to lose. Dell'Oro Group reports that Nortel captured 43.2% of the overall optical transport market in third-quarter 2000. Part of Mumford's role is to identify acquisition prospects; recent purchases include CoreTek (for tunable lasers), Qtera (for ultra-long-distance components) and Xros (for photonic switching).

Carl Russo
Group vice president, Optical Networking, Cisco

Optical is one of the hottest areas of growth for Cisco, and Russo is feeding the flames with acquisitions of companies such as Cerent, Pirelli Optical Systems and Monterey Networks. In fiscal fourth-quarter 2000, Cisco earnings included $1 billion in optical gear bookings, up from practically zero in fiscal 1999.

Henry Schacht
Chairman and CEO, Lucent

Returning CEO Schacht inherited (reluctantly) the onerous task of stabilizing telecom equipment maker Lucent after it misjudged high-speed optical market prospects and fell behind rival Nortel. In an effort to reverse the company's slide, Schacht has taken over the restructuring efforts, which call for an executive reorganization and staff reductions. Lucent's stock price is down more than 70% since late November 1999.

Dan Smith
President and CEO, Sycamore Networks

A billionaire with a frugal streak, Smith works from a windowless office and eschews corporate excess. He doesn't drink coffee or tea, saying he has enough energy without the caffeine. The go-to guy at Sycamore, Smith is the complement to visionary Desh Deshpande, Sycamore's founder and chairman. Together the two aim to move the company from a provider of optical point products to one that delivers an end-to-end package. Smith orchestrated the company's September acquisition of Sirocco Systems, which adds optical access products to Sycamore's transport, switching and management products.

Jeanette Symons
CTO and vice president of engineering, Zhone Technologies

Symons doesn't waste any time. Just two days after Ascend Communications was sold to Lucent, the co-founder of Ascend started making plans to launch Zhone Technologies. Symons and Zhone Chairman and CEO Mory Ejabat, another former Ascend executive, kept those plans under wraps for nearly a year before disclosing product details. Despite the low profile, the start-up caused a stir by raising $500 million in financing.

Symons is the company's visionary, responsible for product development. Her track record at Ascend added to the venture's credibility, and investors bought into Zhone's plan to consolidate edge functions in a single system and deliver management control to service providers via a single console. The company's flagship edge switch/router will incorporate a DSL access multiplexer, digital-loop carrier and more.

Standards **superstars**

Steve Bellovin
AT&T fellow, AT&T Labs Research; chairman, ICMP Traceback Working Group of the Internet Engineering Task Force

While eBay, Amazon.com and other high-profile sites may not have seen February's distributed denial-of-service attacks coming, Internet security expert Bellovin predicted they would happen. These days, he's working on a project that might help combat such attacks. Bellovin is chairman of an Internet Engineering Task Force working group that is studying ways to trace the path of packets through the Internet, even when the source IP is forged. The group plans to submit a proposal for Internet Control Message Protocol Traceback Messages in January.

Tim Berners-Lee
Director, World Wide Web Consortium

The inventor of the Web presses on. He runs the W3C, which continues to drive Web standards in such areas as XML, privacy and accessibility. Berners-Lee chronicles the Web's creation, its evolution, his take on its potential and what the future holds in his book, *Weaving the Web*.

Vinton Cerf
Senior vice president of Internet architecture and technology, WorldCom

Not content to rest on his TCP/IP laurels, Cerf continues to improve the Internet framework he helped create. He is replacing Esther Dyson as chairman of the Internet Corporation for Assigned Names and Numbers. Cerf weighed in on the Carnivore debate in September, testifying that the FBI's controversial surveillance system is not "technically abusive." On the side, he acts as technical adviser for the television show "Gene Roddenberry's Earth: Final Conflict." One thing he told the *Industry Standard* he wished he had invented? Teleportation. Perhaps in his spare time.

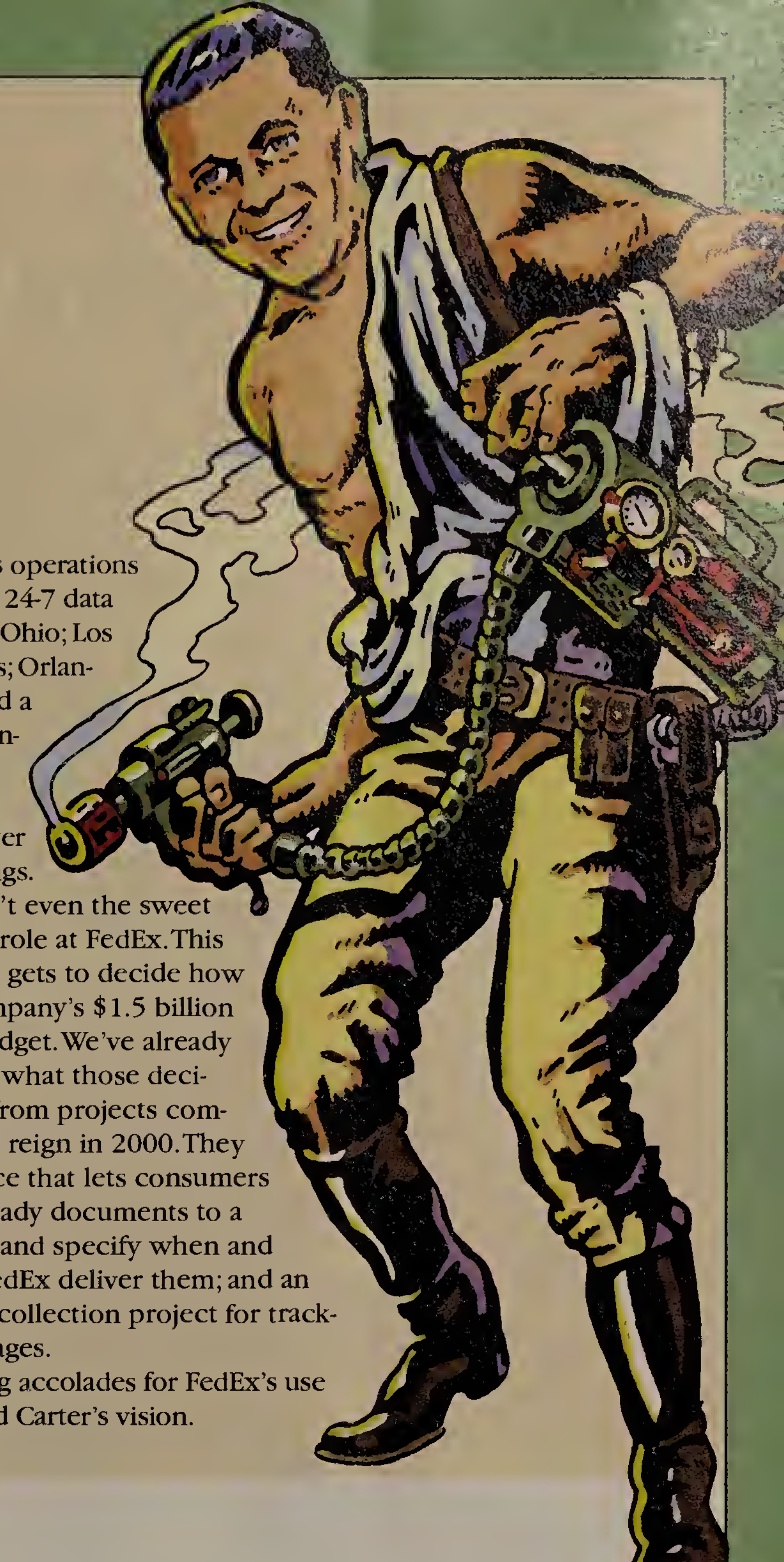
Scott Goldman
CEO, WAP Forum

Airwaves have long been a passion of Goldman, who in college aspired to be a radio disc jockey. Nicknamed the Wireless Wizard, Goldman has built a career researching, designing, operating and selling paging, cellular and wireless data services around the world. Some of that interest apparently stems from a childhood obsession with wires. In an excerpt from his book, *Ask the Wireless Wizard*, Goldman writes: "I hate wires. Ever since I was a kid, I've hidden them, buried them and stuffed them underneath carpets. They're unmanageable, easy to trip over and make your house, desk and car look like a spaghetti factory hit by a hurricane."

Today he heads the WAP Forum, the industry association responsible for the Wireless Application Protocol. Among the group's controversial decisions: The next version of the WAP application — due out midyear 2001 — will support Extensible HTML, rather than Wireless Markup Language.

John Klensin
Chairman, Internet

Network executive **forces**



Robert Carter

Executive vice president and CIO, FedEx Corp.

Six months ago, this self-described family man stepped into one of the most coveted technology jobs in the world, chief information officer of FedEx. But even before that, Robert Carter had become an icon in the IT community.

Well known as a new-breed technology executive — one who balances business sense with technology know-how — Carter became FedEx's first chief technology officer (CTO) in 1998. He is largely credited for the company's role-model e-business initiatives, having overseen development of the globalization frameworks that let Fedex.com operate in multiple languages — critical for an international shipper. For his work as CTO (as well as senior vice president) of FedEx, Carter in May 2000 earned the first CTO of the Year Award issued by *InfoWorld*, a sister publication of *Network World*.

Carter's competence is so coveted inside corporate raiding circles that CIO predecessor Dennis Jones announced Carter's promotion months in advance, just to keep the headhunters at bay.

As CIO, Carter is responsible for FedEx's prized state-of-the-art global network. He also shoulders operations of the company's 24-7 data centers in Akron, Ohio; Los Angeles; Memphis; Orlando; Pittsburgh; and a newly opened center in Dallas. He'll also construct a seventh data center in Colorado Springs.

But those aren't even the sweet spots of his new role at FedEx. This Taiwanese native gets to decide how to spend the company's $1.5 billion infrastructure budget. We've already seen glimpses of what those decisions will entail from projects completed during his reign in 2000. They include an alliance that lets consumers upload printer-ready documents to a Kinko's Web site and specify when and where to have FedEx deliver them; and an $80 million data collection project for tracking ground packages.

Expect ongoing accolades for FedEx's use of technology and Carter's vision.

Peter Solvik

CIO, Cisco

Quiet determination and intensity define Pete Solvik. His vision for Cisco's internal IT operations show the potential of Internet technologies — and it's only the beginning.

Talk about eating your own dog food — at Cisco, Solvik for years has dished out Cisco Dog Chow and then some. Under Solvik's reign as chief information officer, Cisco's business operations have become the quintessence of e-business. Practically everything is virtualized: manufacturing, accounting, sales, the supply chain, even customer support.

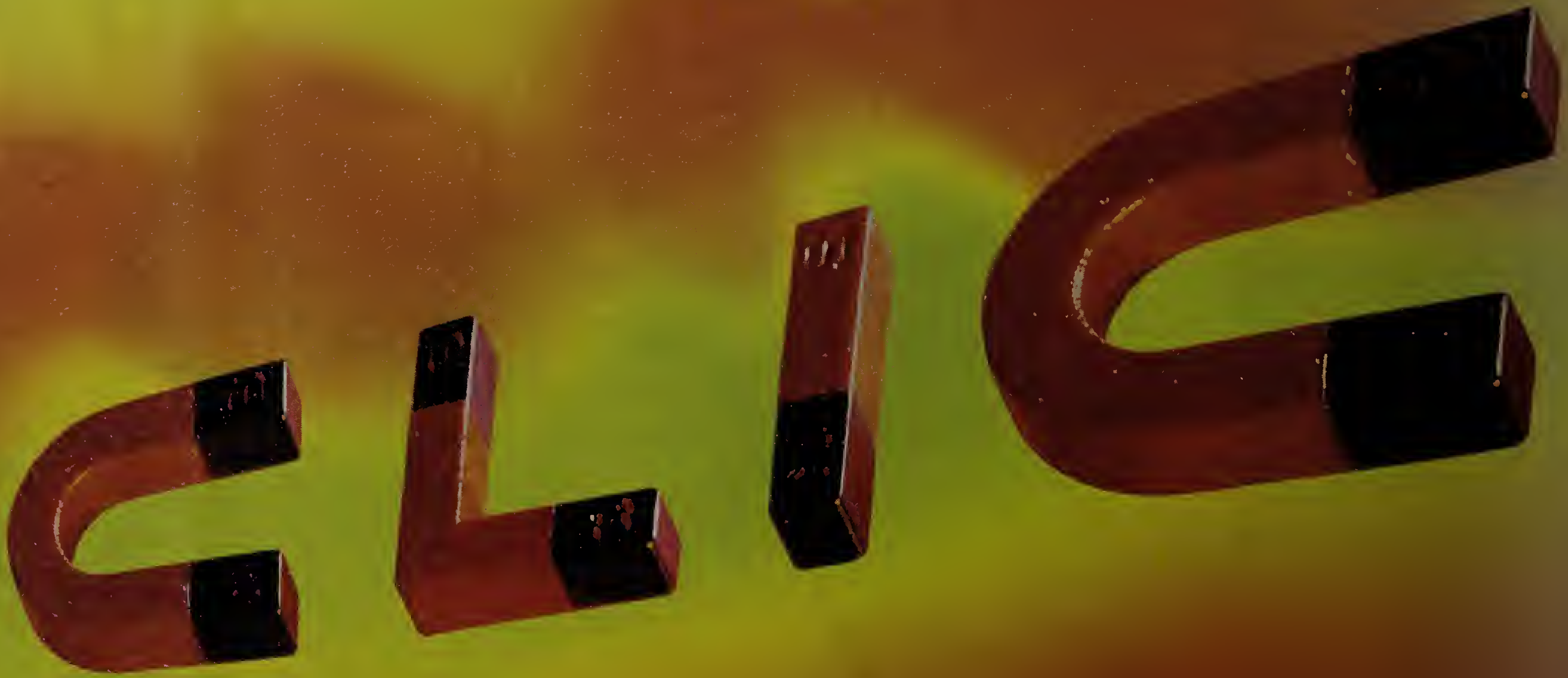
Solvik has spun a web so all-encompassing that it is the envy of the e-world. Cisco's use of the Internet and Web has distinguished the firm from competitors and the rest of the industry, and has earned Solvik numerous industry accolades, including *Network World's* "50 People Who Make a Difference in Enterprise Networking." Cisco Connection Online, Cisco's Web site, recently surpassed the $20 billion run rate, elevating it to one of the world's largest revenue-generating Web sites. Solvik is also responsible for Cisco's Internet Business Solutions organization, which evangelizes Internet technologies and then markets the heck out of Cisco products as the underpinning of the ideal e-business infrastructure.

Solvik's insight is so valued that he's on the advisory board of Akamai Technologies, Agillion and Oblix. He's also on the board of directors for Internet Capital Group, Context Integration, Cohera, Asera and myCFO.

Throughout it all, Solvik has kept a low profile. He keeps his head down but his eyes focused on building an Internet prize that could be the most powerful argument yet for transforming the corporation.

See **25 Most Powerful**, page 54

You told the Board your site would attract millions of hits.



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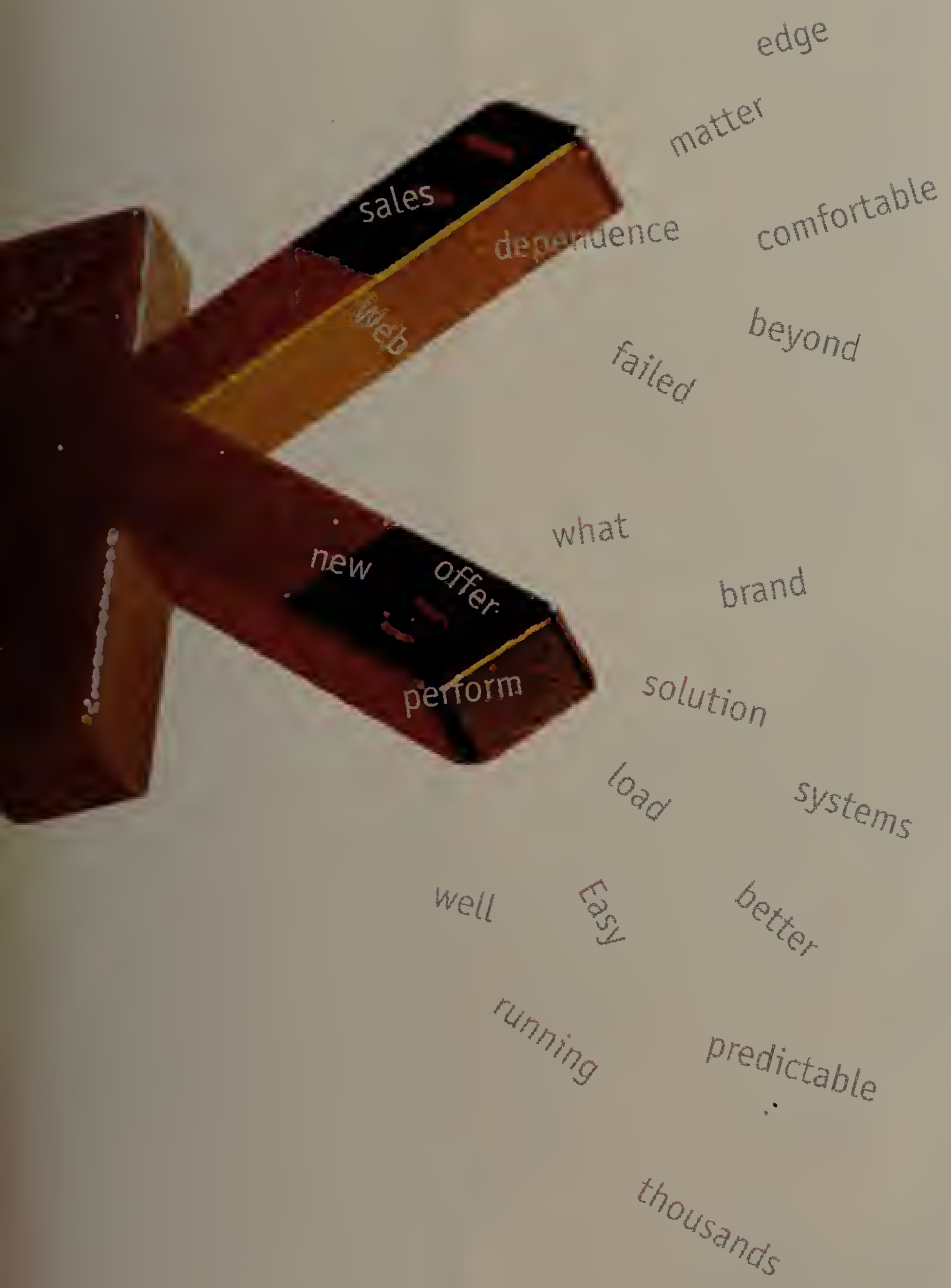

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The money guy

Vinod Khosla

General partner, Kleiner, Perkins, Caufield & Byers

Drive, ambition and vision define Vinod Khosla. Some industry watchers consider him the most influential figure in Silicon Valley and blessed with the Midas touch.

Khosla dreamed of starting a technology company when he was 15, and he was determined to become a millionaire before 30. Khosla began making that dream come true two decades ago when he founded Daisy Systems, a maker of computers and software for computer-assisted engineering. In 1982, at the tender age of 27, he helped create Sun. He conceived the idea to optimize SONET for data, a scheme that led to the creation of Cerent, which Cisco acquired in 1999 for $6.9 billion. Khosla was also instrumental in launching Juniper Networks, a company many tout as the next Cisco.

Khosla's current endeavor is funding and managing application service provider start-ups. He is chairman of two such firms, Corio and Asera. Yet he still finds the time to spend breakfast and dinner every day with his wife and four daughters.

That's drive. That's ambition. The vision speaks for itself. That's why Khosla is one of the most powerful people in networking. ◪

Ralph Szygenda

CIO and group vice president, General Motors

Confident, friendly and energetic, Ralph Szygenda is a visionary who deserves some of the credit for GM's No. 1 spot on the Fortune 500. He lords over a $3.2 billion technology budget and is boss to more than a dozen divisional chief information officers. Perhaps most telling, Szygenda runs a venture capitalist fund for GM that invests in cutting-edge automobile technologies.

For example, he is the man that put OnStar into GM's luxury cars. OnStar gives cars a human-friendly interface. It provides directions, offers vehicle diagnostics and even links drivers to live concierge assistance, among other features.

Oddly, this CIO views himself as more of a businessman than a technology guy, although his CIO post at GM was preceded by the CIO post at Texas Instruments. This businessman self-image lets him see two years down the pipe, he says. This allows GM to stay ahead of the IT game.

With Szygenda as a model, IT executives at GM have assumed more say in all business areas. His team has quickly led GM into Internet waters. GM owns gmbuypower.com, an e-commerce portal representing all its brands. Likewise, it's been a shaker in business-to-business e-commerce and is a founding member of Covisint, the exchange currently under construction that will let the Big Three automakers trade with suppliers over the 'Net (pending a final nod from the Federal Trade Commission). Szygenda envisions this business-to-business effort not only as a method of gaining efficiencies with suppliers, but also as a means to link with dealers, gaining those same efficiencies for build-to-order manufacturing. A single electronic supply chain is the Holy Grail for e-business, and this CIO is ahead of the curve in building his now.

Szygenda isn't interested in technology for technology's sake. His billions in IT spending achieves a business goal: keeping the nation's top car company first across the finish line.

25 Most Powerful, continued from page 51

Architecture Board

Klensin is one dedicated volunteer. As the IAB chairman, the strategic planning arm of the IETF, he coordinates the group's agenda, activities and external relationships in between the demands of his real job as Internet architecture president at AT&T. Among the IAB's agenda items are IPv6 and Internet addressing issues. How does he do it all? Thirty years' experience in Internet research and protocol development certainly helps. Klensin helped design the Internet's original file transfer and e-mail systems in the 1960s.

Pamela Samuelson

Professor, University of California at Berkeley; co-director, Berkeley Center for Law and Technology

An expert on cyberlaw and intellectual property, this Berkeley professor teaches at the university's law school and the School of Information Management & Systems. But her drive is to get the public voice heard. When the doors of her brainchild, the Samuelson Law, Technology and Public Policy Clinic open in January, she'll be taking a big step. The clinic will be a watchdog over issues such as Internet surveillance, free speech restrictions, governmental access to confidential files and censoring Internet access in public institutions. Her technology influence extends beyond Berkeley. With husband Robert Glushko, a director at Commerce One, Samuelson established a four-year scholarship for women pursuing science or technology degrees at the University of Washington.

Industry watchdogs

Eugene Spafford, director, Center for Education and Research in Information Assurance and Security, Purdue University

Spaf, as he's known to friends, is all about the technical and ethical nuances of information security. In 2000, he met with President Clinton, staff and 28 security experts to discuss last winter's high-profile distributed denial-of-service attacks. He's known for his analogies, such as this one: "Usenet is like a herd of performing elephants with diarrhea: massive, difficult to redirect, awe-inspiring, entertaining and a source of mind-boggling amounts of excrement when you least expect it."

Mario Monti

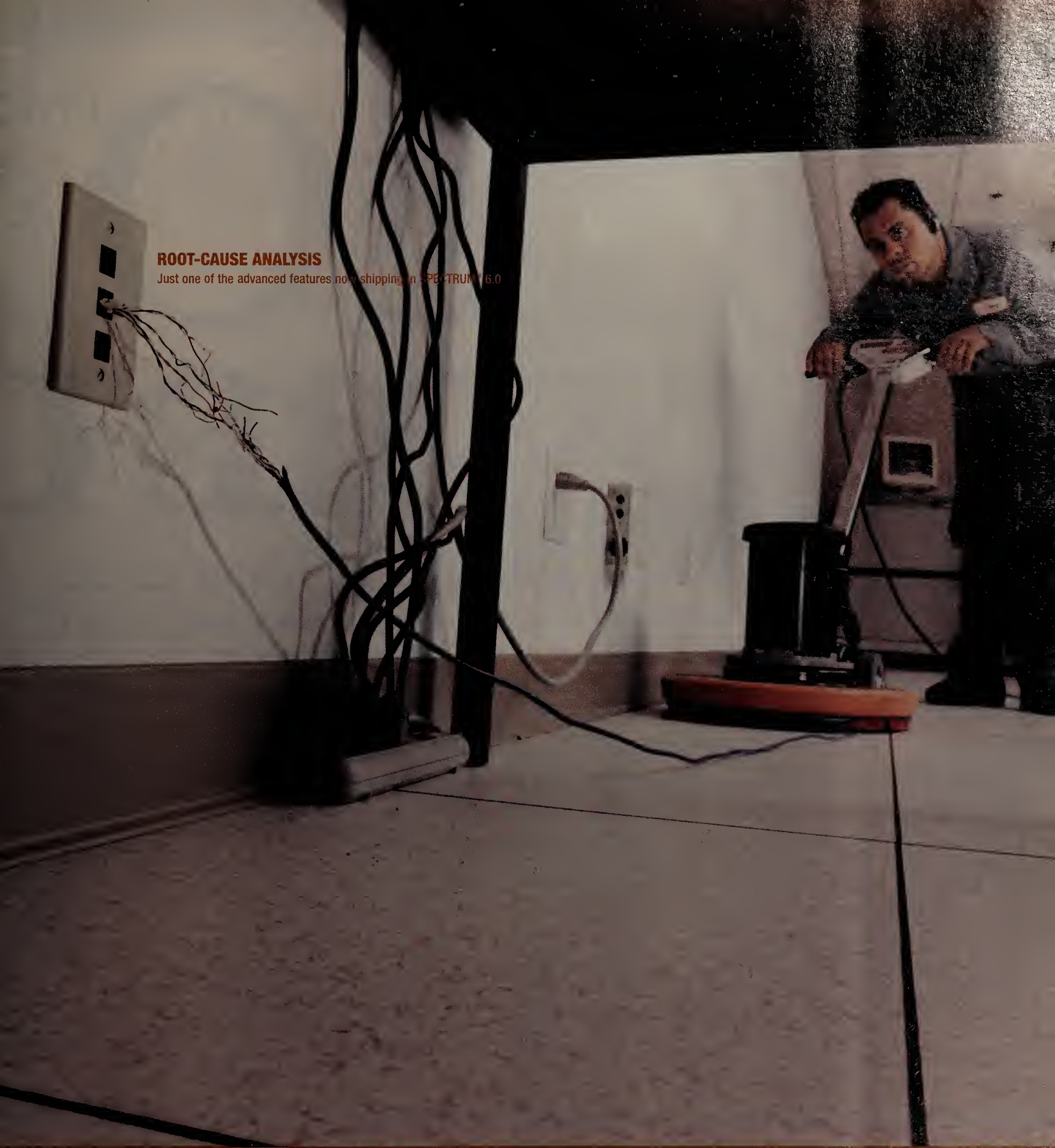
European competition commissioner, European Union

Dubbed Super Mario by the European press, Monti isn't afraid to flex his regulatory muscles on either side of the Atlantic. Rather, the Italian-born commissioner who serves as the European Union's antitrust chief seems to thrive on it. Just ask WorldCom and Sprint. Or Time Warner and EMI. The European Commission — the executive arm of the EU — vetoed the WorldCom/Sprint merger, and objections raised by Monti's office effectively killed the proposed Time Warner/EMI deal. Time Warner fared better with its AOL merger plans; the EU granted approval of the merger in October after a four-month investigation.

Marc Rotenberg

Executive director, Electronic Privacy Information Center

Privacy champion Rotenberg is out to protect citizens and keep the feds' electronic surveillance capabilities in check. He divides his time among running the Electronic Privacy Information Center, testifying before Congress, teaching information privacy law at Georgetown University Law Center ... and playing chess. Rotenberg has long been an activist; he recalls marching at the age of 7, with his parents and wearing a sandwich board, to protest the Vietnam War.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BY JULIE BORT

CEO power c

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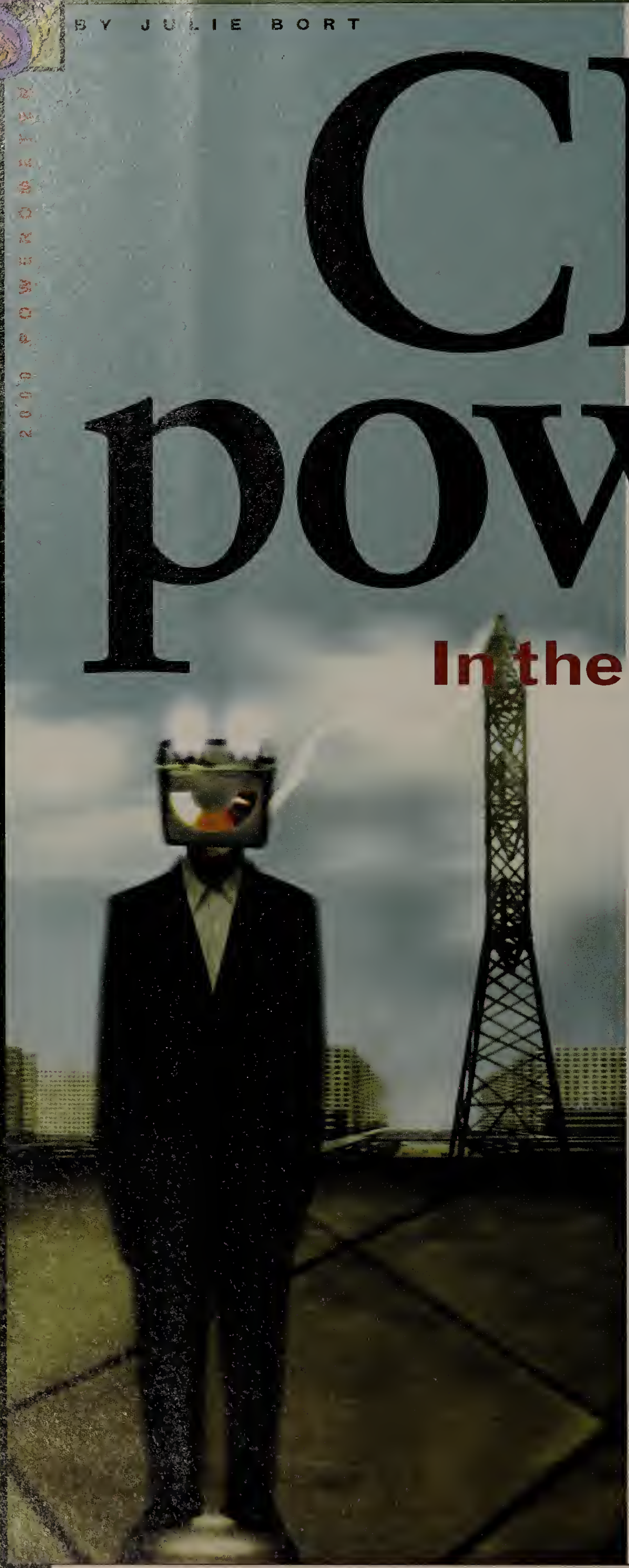


In the fast-paced network industry, only a few individuals can entrench themselves in power year after year.

Chief among them is John Chambers, Cisco's indefatigable CEO. For the first time, Chambers has grabbed the No. 1 spot in *Network World's* annual reader poll of the most powerful vendor CEOs. This comes after reigning Powerometer leader, Bill Gates, excused himself from the running by handing over his CEO responsibilities at Microsoft to Steve Ballmer. Chambers had been biting at Gates' heals for two years; Ballmer is now second to Chambers.

Like our previous four Powerometer surveys, we asked 250 *Network World* readers to rank the power of 25 vendor CEOs on a scale from 1 to 100, with 100 representing most powerful. Research firm Research Concepts conducted the survey for us.

In deference to these precarious times in which people such as Rich McGinn (former Lucent Technologies CEO) are here today and gone tomorrow, Chambers has reached the summit with a lowball score: 76.7, compared to the 80.4, 79.5, 84.1 and 81.4 Power Ratings Gates earned the past four years, respectively. Our readers see no executive, even Chambers, as a J. Edgar Hoover.

Chambers was one of just a few winners this year. Nortel Networks CEO John Roth was another, climbing eight spots to No. 7, as was Dell CEO Michael Dell, a list newcomer who landed at the No. 5 spot ahead of Oracle CEO Larry Ellison.

Losers were rampant. Our survey closed Oct. 3, just days after 3Com CEO Eric Benhamou announced his retirement and a few weeks before Lucent ousted McGinn. Respondents prophesied by dropping McGinn's ranking from 8 to 11, landing him a spot on this year's list of biggest power losers. Benhamou fell similarly, from 13 to 16, but with virtually the same Power Rating, a 53.3 in 2000 compared to a 53.9 in the 1999 survey.

This does not bode well for Novell CEO Eric Schmidt, who tumbled far less gracefully. Schmidt took a 10-point fall, to No. 20, in the 2000 rankings. He held the No. 10 spot in 1999 and 1998, down two notches from where he debuted on the list in 1997. Two words tell the story: declining revenue.

Schmidt's fall is matched only by that of Computer Associates' CEO. In 1999, Charles Wang ranked No. 12 on our Powerometer. Sanjay Kumar, who stepped into Wang's large CEO shoes in August, landed in the 22 spot on the 2000 survey. That is to be expected of Kumar, who lingers in tough-guy Wang's shadow.

The loser list is also littered with carrier executives. BellSouth's Duane Ackerman slipped seven spots, AT&T's C. Michael Armstrong five and WorldCom's Bernie Ebbers three. Readers dropped Armstrong's and Ebbers' rankings before they initiated their respective corporate overhauls, announced after our polls closed.

While newcomer Dell fared extremely well, two others didn't. Respondents see Hasso Plattner, CEO of mighty enterprise resource planning vendor SAP, as watered down in the network industry, despite his increased exposure with business-to-business e-commerce partnerships. Plattner's 47.9 Power Rating left him in the 21 spot. Alcatel CEO Serge Tchuruk, who bought his way

ambers storms the top spot in our annual
der poll of the most powerful vendor
Os; he's one of the **few who fared well.**

rain

onto our survey when Alcatel acquired Newbridge Networks, ranked last with a Power Rating of 38.7.

The GTE-Bell Atlantic merger bumped Charles Lee off the list, from his last-place spot in 1999, even though he holds the co-CEO title at the merged company. Word is that Verizon is really the baby of job-sharing partner Ivan Seidenberg, who budges up just a notch from 1999 to No. 17. ◪

MOST POWERFUL CEOs

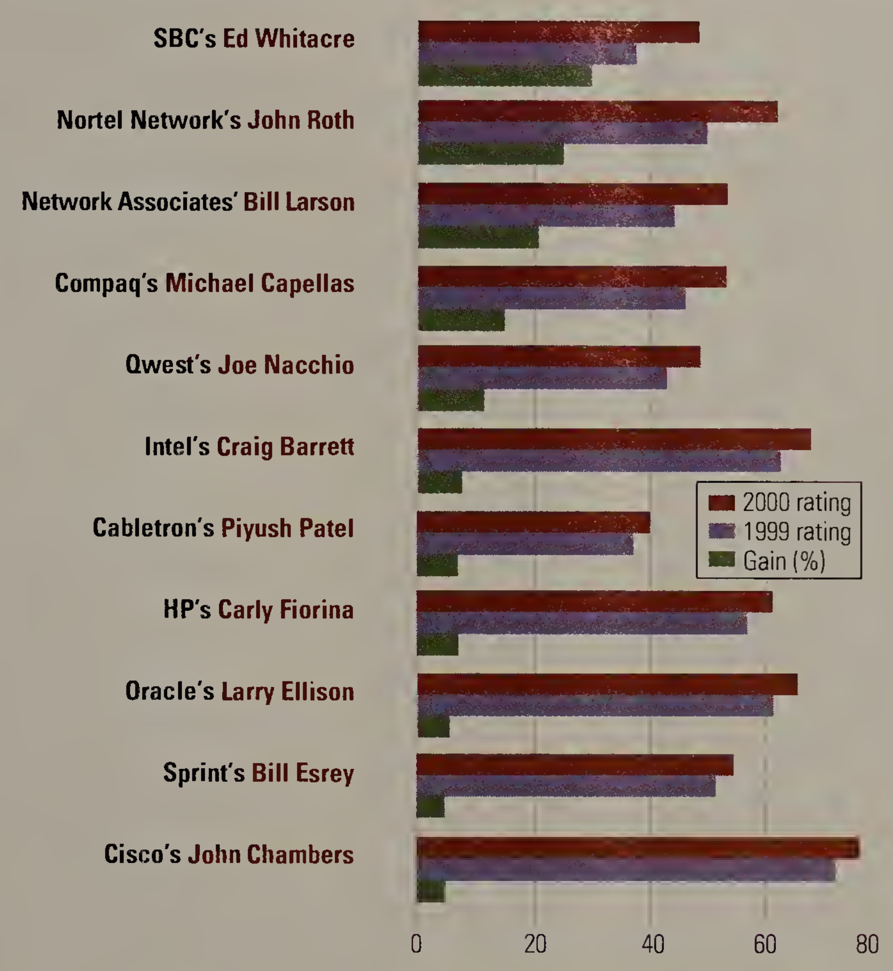
We asked 250 *Network World* readers to rate the power of CEOs on a scale of 1 to 100, with 100 being the most powerful. The Power Rating shows the mean score.

Rank	CEO	Company	2000 Power Rating	1999 Power Rating	1999 Rank
1	**John Chambers**	Cisco	**76.7**	72.4	2
2	**Steve Ballmer***	Microsoft	**69.1**	80.4	1
3	**Craig Barrett**	Intel	**68.3**	63.0	6
4	**Scott McNealy**	Sun	**66.7**	66.7	3
5	**Michael Dell**	Dell***	**66.6**	N/A	N/A
6	**Larry Ellison**	Oracle	**66.0**	61.8	7
7	**John Roth**	Nortel Networks	**62.5**	50.3	15
8	**Lou Gerstner**	IBM	**61.8**	65.2	4
9	**Carly Fiorina**	Hewlett Packard	**61.6**	57.2	11
10	**C. Michael Armstrong**	AT&T	**61.0**	64.3	5
11	**Rich McGinn****	Lucent	**59.7**	60.9	8
12	**Bernie Ebbers**	WorldCom	**55.5**	59.8	9
13	**Bill Esrey**	Sprint	**54.9**	51.8	14
14	**Bill Larson**	Network Associates	**53.8**	44.6	20
15	**Michael Capellas**	Compaq	**53.6**	46.5	17
16	**Eric Benhamou****	3Com	**53.3**	53.9	13
17	**Ivan Seidenberg**	Verizon***	**50.1**	N/A	N/A
18	**Joe Nacchio**	Qwest	**49.1**	43.3	21
19	**Ed Whitacre**	SBC	**48.9**	38.0	23
20	**Eric Schmidt**	Novell	**48.7**	58.6	10
21	**Hasso Plattner**	SAP***	**47.9**	N/A	N/A
22	**Sanjay Kumar***	Computer Associates	**47.1**	54.0	12
23	**Duane Ackerman**	BellSouth	**46.3**	47.5	16
24	**Piyush Patel**	Cabletron	**40.4**	37.5	24
25	**Serge Tchuruk**	Alcatel***	**38.7**	N/A	N/A

* 1999 figures denote scores for previous CEO. ** Still CEO when survey conducted.
*** Company was not surveyed last year.

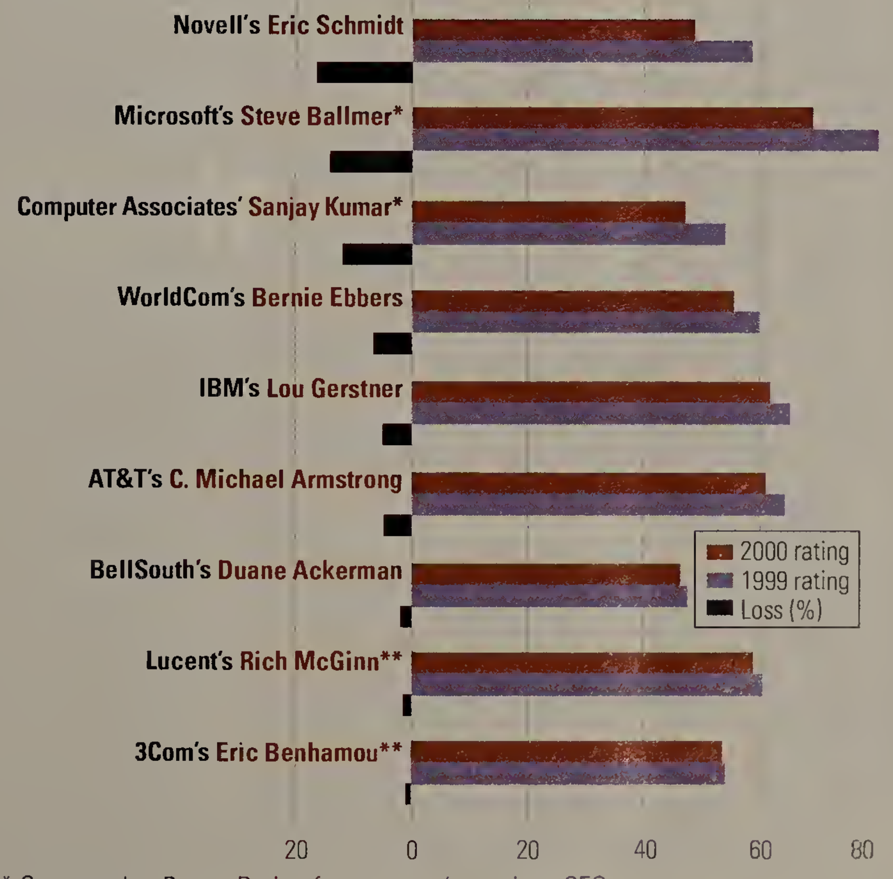
CEO POWER CLIMBING

Respondents tell us which CEOs they think gained the most influence over corporate network technology in 2000.



CEO POWER ON THE DECLINE

Respondents tell us which CEOs became less influential over corporate network technology in 2000.



* Compared to Power Rating for company's previous CEO.
** No longer CEO

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BY *NETWORK WORLD* STAFF

10 power struggles shaping the network industry

The vice president of sales has sent you an urgent e-mail: He wants you to reverse IT's policy forbidding PDAs to connect to the corporate network. You know what his argument will be — you've heard it from three other department heads.

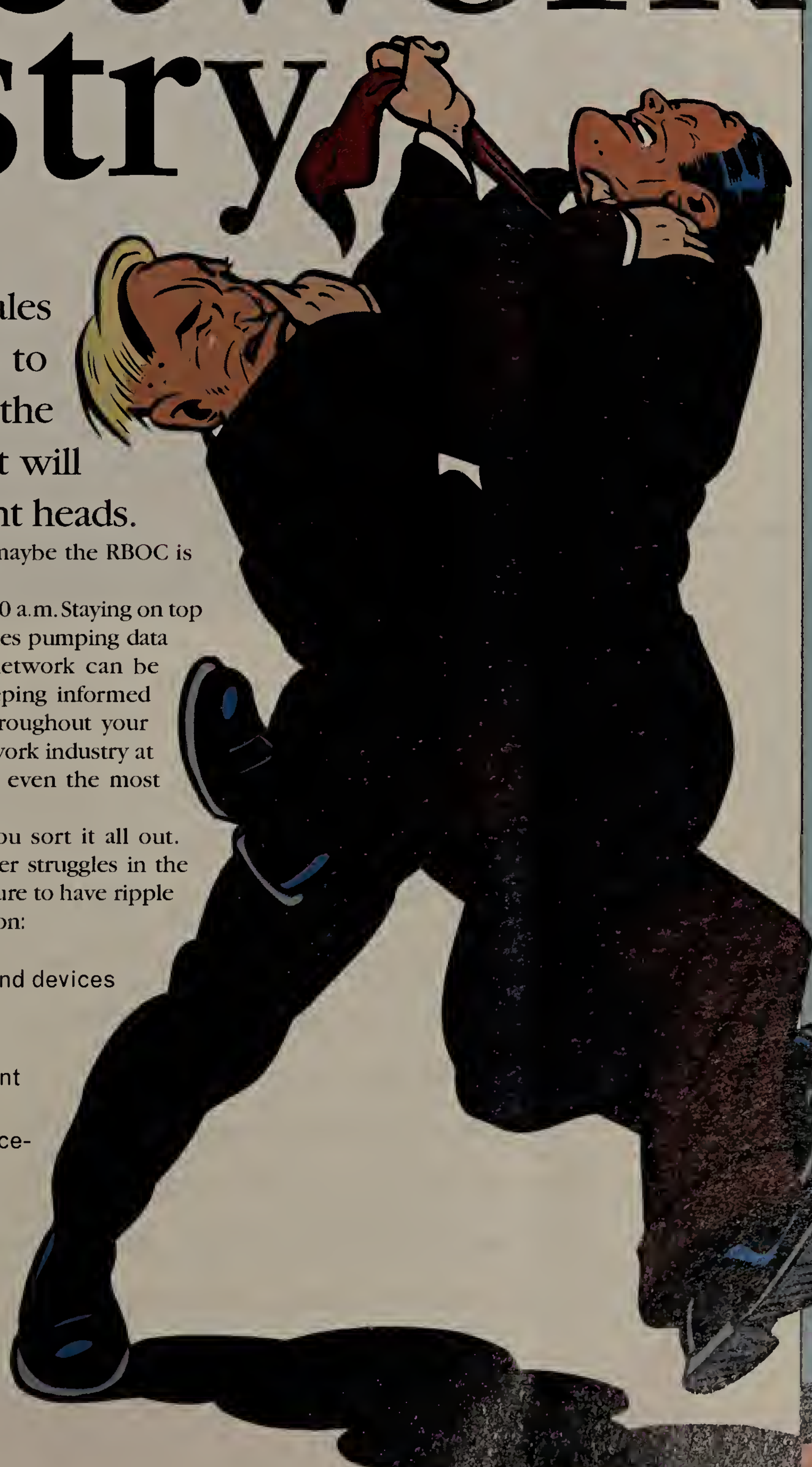
These devices are indispensable to businesspeople now, and IT simply must support them. Yet none of the departments wants to chip in to pay for the extra manpower and security such support would require.

Meanwhile, you're wrapping up a phone call with your regional Bell operating company account manager. She's been lobbying you to sign on for the RBOC's new DSL service to give teleworkers high-speed, always-on access to corporate resources. Until this aggressive pitch, you'd been leaning toward inking a deal with a national competitive local exchange carrier (CLEC) specializing in DSL. You'll have to put your decision on hold and reevaluate. You've heard whispers that the DSL CLEC is financially unsound, so maybe the RBOC is the right choice after all.

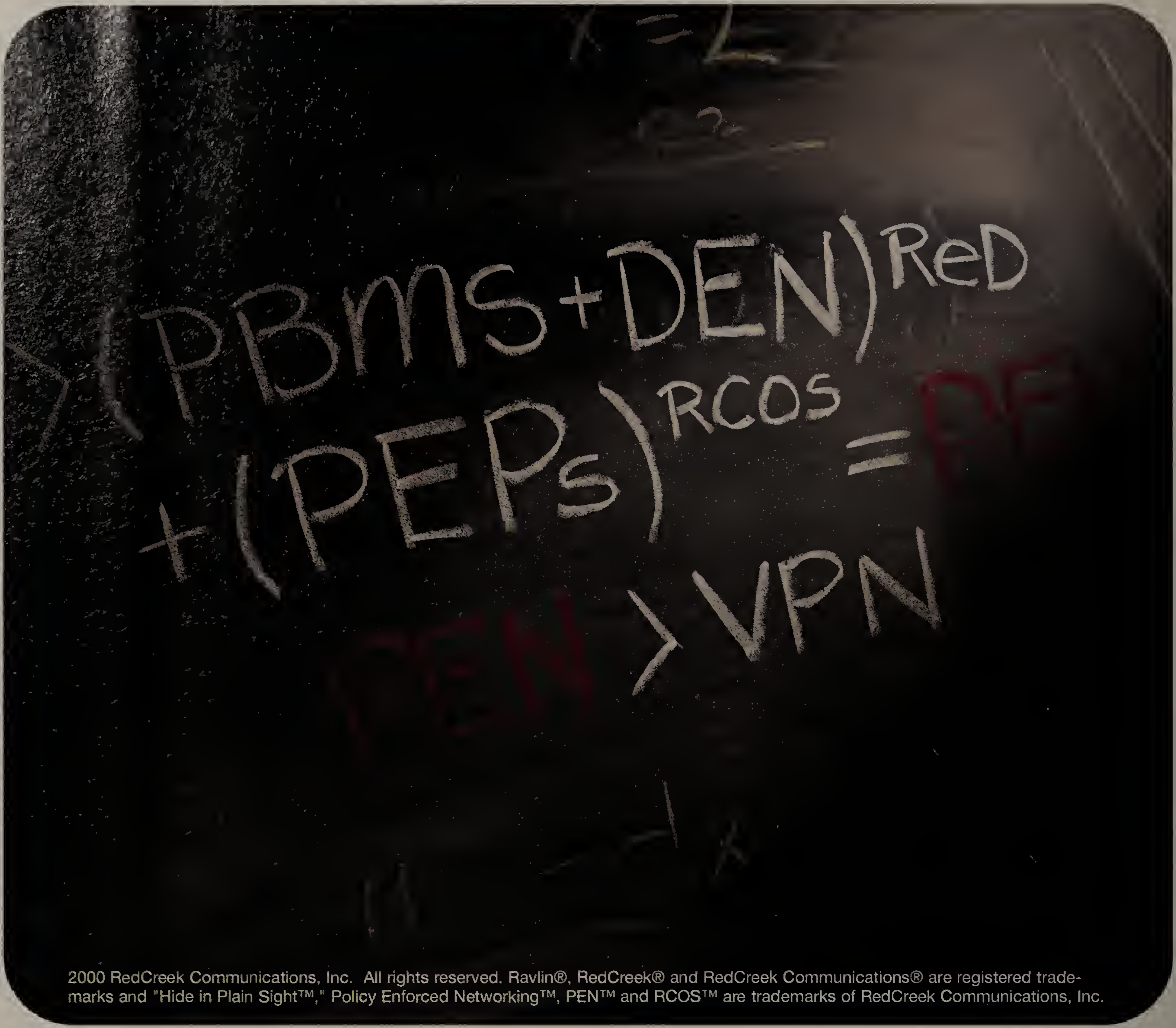
All this and it's only 9:10 a.m. Staying on top of the routers and switches pumping data across the company's network can be challenging enough. Keeping informed on what's happening throughout your company and in the network industry at large is enough to bury even the most organized IT executive.

We're here to help you sort it all out. Here's a look at 10 power struggles in the network world that are sure to have ripple effects in your organization:

- The growing clash between users who bring unsanctioned applications and devices to work and net executives who must control them. **Page 61.**
- The battle between RBOCs and CLECs for your DSL business. **Page 63.**
- SBC Communications' fight with regulators to decommission copper plant and replace it with fiber. Is this a bellwether case? **Page 65.**
- The ongoing struggle of voice over IP. Which is better, an IP PBX or a voice-over-IP gateway? **Page 67.**
- How network management framework vendors and point product makers are striving to build all-in-one solutions. **Page 69.**
- The struggle to understand and choose a directory service. **Page 71.**
- Quality of service vs. big bandwidth. **Page 73.**
- Linux's battle against the operating system titans. **Page 75.**
- The jousting among network infrastructure, storage start-up and Fibre Channel vendors over storage-over-IP standards. **Page 77.**
- The continuing contest between Sun and Microsoft on the application development front. **Page 79.**



ILLUSTRATIONS BY MARK MATCHO



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BY ANN SULLIVAN

Who's running this network anyway?

Mobile devices and multimedia downloads are capturing users' attention — and drawing fire from network managers.

Like a 14-year-old who shows a bunch of kids how to inhale helium from balloons, some users aren't such great influences on their peers.

One employee had been with his company for only two days when he downloaded Napster — and proceeded to teach everyone else in his department how to do so. "Thanks, new guy," quipped an IT staffer who witnessed the fallout. The company until then had been pretty liberal about employee Internet usage, but not long after, network executives decided to block users from downloading music files.

Incidents such as this perpetuate the stereotypes that exist about users and IT staff members. Users view IT as an obstacle, and IT views users as uninformed troublemakers.

"Users should not be given carte blanche to do whatever they want, how they want, simply because they prefer something else or believe something else is better," writes one Network World Fusion reader. "It's not their job, and they almost always end up creating bail-me-out work for IT."

From the other side of the fence, another reader writes: "IT should be introducing new applications to better meet users' needs in the marketplace. Instead, they assign themselves the role of 'standards cop,' with the philosophy that everyone should mold their operations around IT rather than the other way around."

Struggle summary

Struggle: Users exercising their download skills and IT staffers flexing their administrator muscles.

Opponents: Users vs. IT

Outlook for resolution: If users communicate their needs to IT rather than taking matters into their own hands, IT departments can become more proactive about finding the right tools to increase users' productivity. There will always be stubborn parties on both sides.

User impact: Give a little, get a little. Cut back on the recreational activities and business tools may improve.

For IT, trying to keep things standard is a frustrating, draining proposition, particularly as users become more Internet-savvy and start playing with instant messaging, downloading audio files or tuning in to Internet radio.

Bono Vox, a systems administrator at an insurance processing company, explains how he deals with users who alter settings without permission and deviate from company-approved applications and devices: "I've given up. I provide a standard. I don't give a flip one way or the other whether users use the standard app or their own. They can use DOS edit.com if they want to. Just don't call me."

So who's to blame for such bad will? First there are the users who ignore corporate policies without considering that legitimate management and security reasons might warrant software and hardware restrictions. Then there are the IT staffers who deny all nonstandard requests without considering that genuine business reasons might justify deviating from standards.

"It's a two-way street, and both sides have their share of maniac drivers," says Andrew Bell, network manager at Siemens Milltronics Process Instruments in Ontario, Canada.

Tempting apps

While the battle between IT and users is not new, it has taken on new life as mobile devices and file-sharing services such as Napster multiply and make their way onto the enterprise network.

That's happening at a steady clip. The U.S. mobile and remote-user population will grow from 39 million in 2000 to 55 million in 2004, predicts market research firm IDC. As for Napster, it claims 38 million users, according to company figures. Even if Napster's recent deal with Bertelsmann AG — and the likelihood that the partnership will yield a fee-based service — hurts Napster's popularity, other free file-swapping sites are tempting users. Among them are Gnutella and iMesh.

Granted, it's much easier to make a business case for a mobile device than it is for using recreational services such as Napster. For corporations, deciding to ban Napster isn't tough to justify.

"Anything seen as an uncontrolled data pipe is disallowed. Napster certainly ranks right up there," says one network architect, who asked not to be identified, at a regional bank in the Midwest. For one business unit that truly needs access to .wav and other multimedia files considered a security risk, the bank has set up a separate firewall.

At the same bank, network executives made a decision about a year ago to support PDAs in-house, provided the devices comply with a defined configuration. A business case must be made before IT commits to supporting any new devices, says the network architect: "It's not just toys for toys' sake."

One department at the bank wants to go a step further and deploy mobile devices with wireless access. But wireless access raises additional security concerns. "We don't want to discourage enthusiasm," says the network architect, but "they've done some things that have put us at risk, and we've had some conversations."

Indeed, dialogue is required to keep peace between parties — and to ensure business users have the tools to do their jobs, and IT has proper training and resources to support those users. Developing policies to accommodate users or departments that have nonstandard IT needs requires cooperation from both sides.

At Fisher Scientific, a wholesale distributor headquartered in Hampton, N.H., senior systems analyst Larry Reynolds is behind a pilot project to give the company's national sales staff remote access to corporate data via Palm Vx devices with OmniSky wireless services. Currently 10 pilot users are trying the setup, Reynolds says. If the Palm proves to be a robust enough platform and provides cost benefits, the device will be rolled out to 400 sales staffers in the coming year.

The company chose a mix of technically savvy users who had used mobile devices before and some users new to the Palm platform. Supporting the users is challenging because they work remotely.

Face-off follow-up Two network managers hash it out over whether users should be allowed to add personal devices to the corporate net. Page 81.

Also, because the program is so new, no one is trained to support the users with wireless access. As a result, Reynolds is the de facto support staff because he's the most experienced. "I have to train the support staff to support these users," he says.

Meanwhile, fielding phone calls from sales staff takes away from his real job — developing applications. "It definitely requires some patience," he says.

Reynolds and the rest of the IT department at Fisher Scientific are making a serious attempt to adjust to new trends. As IT observed PDAs evolving from personal toys to business tools, it got behind a corporate effort to take advantage of mobile devices for enterprise applications. A trial period provides a good opportunity to uncover weak areas in the plan — such as support — before a full-scale rollout.

That kind of preparation cuts down on strife. After all, at any company, an application or device that IT has an opportunity to evaluate properly stands a much better chance of a favorable reception than one that IT is made aware of only after it has crashed a workstation or spread a virus. ◪

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BY TIM GREENE

The DSL decision

DSL CLECs and RBOCs want your DSL business. What's your best choice?

Enterprise IT managers trying to set up DSL networks for far-flung remote workers face a tough decision. Do they hire a pure national DSL provider, or do they do business with the individual regional Bell operating companies that own the phone lines?

For now, the best bet is the former, even though the RBOCs own the phone wires and vie for the same customers as the DSL competitive local exchange carriers. DSL CLECs are running into a financial pinch right now, but they have wider geographic spreads than individual RBOCs. Plus, the more experienced CLECs are getting good at squeezing the DSL essentials out of the RBOCs, a chore still new to the RBOCs.

As a result, delegating the setup of corporate DSL networks to CLECs can save time and reduce corporate IT staff involvement, both of which translate into cost savings for enterprise customers.

Looking ahead, though, the advantage is shifting rapidly to the RBOCs, as these deep-pocketed behemoths gather speed and ultimately overtake their fast-starting adversaries.

A multilayered service

To set up DSL access to corporate VPNs, enterprise network managers have few options. They can buy DSL lines from the RBOC serving their remote sites, hooking those workers to the corporate site. But coordinating a DSL deployment that involves more than one RBOC, and potentially more than one ISP, can be a hassle. You've got to negotiate with the carriers one at a time and hope that you can establish similar monitoring and technical support services agreements with each.

"You're better off getting someone else to act on your behalf. It saves 15% to 20% in operating costs if you go to one provider rather than many for DSL service," says Steve Sazegari, principal at telecom consulting firm Tele.Mac.

That someone else can be a DSL CLEC that deals with the RBOCs, setting up and delivering the lines. It can be an ISP that works with a DSL CLEC on line delivery. Or it can be a service provider that gets DSL lines through DSL CLECs, then bundles that DSL service with Internet access and network monitoring. Fiberlink, a provider of Internet-based VPNs, is one such company.

Whichever way you go, you'll probably find that delivery and support could be better. DSL CLECs say the RBOCs — BellSouth, Qwest Communications, SBC Communications and Verizon — purposely drag their feet to slow delivery times.

"Everyone's hands are tied by the local carrier. If any improvements are to be made, they must take place at the local carrier," says Michael Asmus, a network consultant, who lived through his own four-month DSL-installation ordeal.

Carriers are making progress. A line-sharing method introduced this year should help streamline the process by which CLECs obtain phone lines from RBOCs. Line sharing lets a CLEC run DSL over the same phone line an RBOC is using to provide regular voice service. It's accomplished using standard DSL and phone equipment, splitting voice channels to the phone network and data to the DSL network. Alternatively, CLECs have to order separate pairs of phone wires just to carry DSL.

Line sharing, which went into use this summer, is expected to become the dominant way DSL lines are provisioned in 2001, CLECs say. Enterprise IT managers will be able to more easily set up and add to telecommuter DSL networks because line sharing will cut the average provisioning time from 35 to 15 days or less, says Vinu Sundaresan, vice president of software engineering for Covad Communications, a struggling CLEC in Santa Clara.

Extended links

DSL CLECs and RBOCs are also in the process of linking their ordering systems. RBOCs have worked out how to let CLECs access their proprietary systems, and these bonded ordering systems are coming online now. When these links are completed, a customer request entered into a CLEC ordering system will be dropped into the RBOC ordering system. CLECs will no longer have to fill out and fax order forms to RBOCs, which in turn enter the order into their systems by hand.

Covad has extended this speedy electronic bonding to customers via a Web interface. Customers can check for DSL availability from www.covad.com and place orders. From the Web, the order passes into Covad's ordering system and to the RBOC's. Covad says 80% of its orders come via this method.

These advances will ultimately work to the advantage of the RBOCs, which will probably buy up the DSL CLECs to beef up their own DSL deployment. SBC has bought a share of Covad, and Verizon flirted with buying NorthPoint Communications before backing out in November. More of these RBOC/CLEC pairings are likely to come to fruition in 2001, says Brent Bracelin, a financial analyst with Pacific Crest Securities.

DSL CLECs, once the darlings of Wall Street and venture capitalists, are under pressure to turn big profits quickly. Financing is drying up and CLECs will look more favorably on being bought out than they might have a year ago, he says.

But don't despair about DSL itself; it will still be around even if you're getting it from a different carrier than you originally signed with.

Struggle summary

The struggle: Upstart DSL service providers that cater to businesses rely on their competitors, the RBOCs, for the lines that carry DSL service. Cooperation could be better.

The opponents: DSL CLECs, young companies that specialize in providing DSL services for businesses, vs. RBOCs, which own the phone lines the DSL CLECs need and that also sell DSL services.

Outlook for resolution: Even though the RBOCs will become more cooperative, they will win. The weaker DSL CLECs will go bankrupt, and the stronger will be absorbed by larger providers.

User impact: Getting DSL service will get easier, but not right away. This will happen gradually, and eventually the process will become routine.

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BY DAVID ROHDE

The fight for fiber and copper

Tables turn as **Project Pronto** has SBC arguing for new technology and CLECs for the old.

Do you have branch offices or teleworkers in the 13 states controlled by mega-Bell SBC Communications? If so, grab your 2001 calendar and put a big red circle around Sept. 1.

That's the date the government will begin letting SBC take copper subloops out of service if it has replaced those loops with fiber running from the central office to remote neighborhood terminals.

Fiber-to-the-neighborhood is the architecture behind Project Pronto, a three-year, $6 billion initiative that SBC launched in October 1999 to dramatically shorten the distance DSL service has to run over copper. But if you think decommissioning the rest of the copper plant from the remote terminal to the central office represents a long-awaited new day for broadband, you probably haven't talked to a competitive local exchange carrier (CLEC) recently.

Far from heralding SBC's plan as a breakthrough, the CLECs are enraged about it. They have convinced the Federal Communications Commission to open what amounts to two Project Pronto investigations that will continue into the new year.

The resulting war between SBC and its local competitors is a regulatory battle like no other. SBC's reputation as a sharp-elbowed regional Bell operating company has landed it in endless disputes with competitors at the FCC and in the courts. But this time it's the legacy carrier arguing that more fiber and less copper is the way to go, and it's the "next-generation" carriers that say they need an old-fashioned telephony plant to leapfrog the incumbent's allegedly inadequate fiber-based broadband service.

Illogical? Not in Washington, D.C., where lawyers for both sides have poured into FCC offices to plead their cases. Plead is no exaggeration for many CLECs, which have staked their futures on the ability to sell DSL — and whose funding may run out if the FCC doesn't rule their way soon.

Indeed, the fight over Project Pronto owes its roots to DSL's quirky nature. Because DSL deteriorates over substantial distances, SBC plans to install up to 25,000 neighborhood terminals equipped with Alcatel DSL line cards. The Alcatel gear is supposed to terminate the short remaining copper run from homes and businesses and convert the traffic into ATM cells for shipping over the new fiber to ATM switches at SBC central offices.

The problem for the CLECs is where to put their DSL equipment. Under FCC rules, they're entitled to collocation space in RBOC central offices. But — Catch-22! — under Project Pronto, putting a DSL access multiplexer in an SBC central office doesn't do CLECs any good because the copper loop into the central office disappears.

"The data CLECs are trapped behind the fiber," says Jonathan Lee, vice president of regulatory affairs for the Competitive Telecommunications Association (CompTel), a CLEC trade group. Until recently, FCC rules were murky about what rights CLECs have in remote neighborhood terminals.

What's more, when SBC bought Ameritech in 1999, it promised the FCC it would put its broadband services into an arm's-length data subsidiary that itself would have to petition SBC for items such as collocation space as if it were a CLEC. So Project Pronto constitutes exactly the kind of favored treatment for SBC's own data services that the Bell had promised to avoid, CLECs claim. When SBC tried to finesse that problem by asking the FCC to waive the Ameritech merger

Struggle summary

The struggle: SBC and the CLECs are fighting over SBC's Project Pronto plan to deploy DSL service from remote neighborhood terminals instead of central offices.

The opponents: On one side is SBC, which wants to run fiber from central offices to thousands of DSL remote neighborhood terminals to reduce DSL distance restrictions dramatically for most of its users. On the other side are CLECs, which say such a plan will block them from offering DSL service because there's either not enough room in the neighborhood terminals to collocate DSL equipment or it's too expensive to do so.

Outlook for resolution: The FCC issued what it believed was a compromise in September, which a CLEC association promptly rejected. A resolution may have to wait for the FCC administration that takes over following the presidential inauguration.

User impact: Further delays in rolling out Project Pronto may mean millions of users in SBC territories will remain too far from central offices to receive DSL service. But if CLECs can't offer their own DSL services over the Pronto architecture, SBC may wind up with little or no DSL competition.

conditions so that the DSL line cards could be owned directly by the parent company, the CLECs hit the roof (www.nwfusion.com, DocFinder: 2129).

Yet SBC has held a trump card all along. If Project Pronto is fully implemented, it will bring DSL availability to 20 million homes that previously couldn't be reached by any DSL carrier because of distance limitations. That's a consumer benefit no CLEC can hope to match — one that SBC lobbyists have pressed hard with top FCC officials.

If SBC prevails, at least two of the other three RBOCs could follow its lead. Qwest Communications is looking closely at a remote-terminal buildout in the former US West territory to extend its DSL reach. And although Bell Atlantic officials told the FCC last spring they didn't need many remote terminals in the heavily populated Northeast, the RBOC's takeover of the more sparsely populated GTE territories under the merged Verizon is reportedly causing the company to rethink the issue.

In September, the FCC tried to end the SBC dispute with a compromise. The agency agreed to let the SBC parent company take ownership of the Alcatel equipment, guaranteeing it could be legally placed in SBC's remote terminals. In return, SBC agreed to increase the size of its remote-terminal cabinets by 15% to 25%, enabling a limited number of CLECs to collocate DSL equipment in them.

But the FCC's decision landed in the middle of a CLEC financial crisis, with stock and bond prices plunging and new money drying up. Because SBC is planning an average of 23 DSL neighborhood terminals per central office, the collocation offer was a dud for many CLECs.

"If we have to put our equipment next to theirs in every remote terminal, it's going to cost a fortune," complains Howard Siegel, vice president of regulatory policy for IP Communications, a DSL CLEC that competes in SBC's principal territories — Pacific Bell, Southwestern Bell and Ameritech regions. Even larger CLECs that are considering remote-terminal collocation are unhappy because the trunking back to the central office only uses ATM's lowest class of service, available bit rate (ABR).

The FCC says ABR is suitable for generic Internet traffic, and SBC says it's considering ATM constant bit rate for voice traffic. But CLECs that are pitching business DSL as a T-1 access alternative say SBC is ignoring ATM classes suitable for latency-sensitive enterprise data applications, such as real-time and non-real-time variable bit rate.

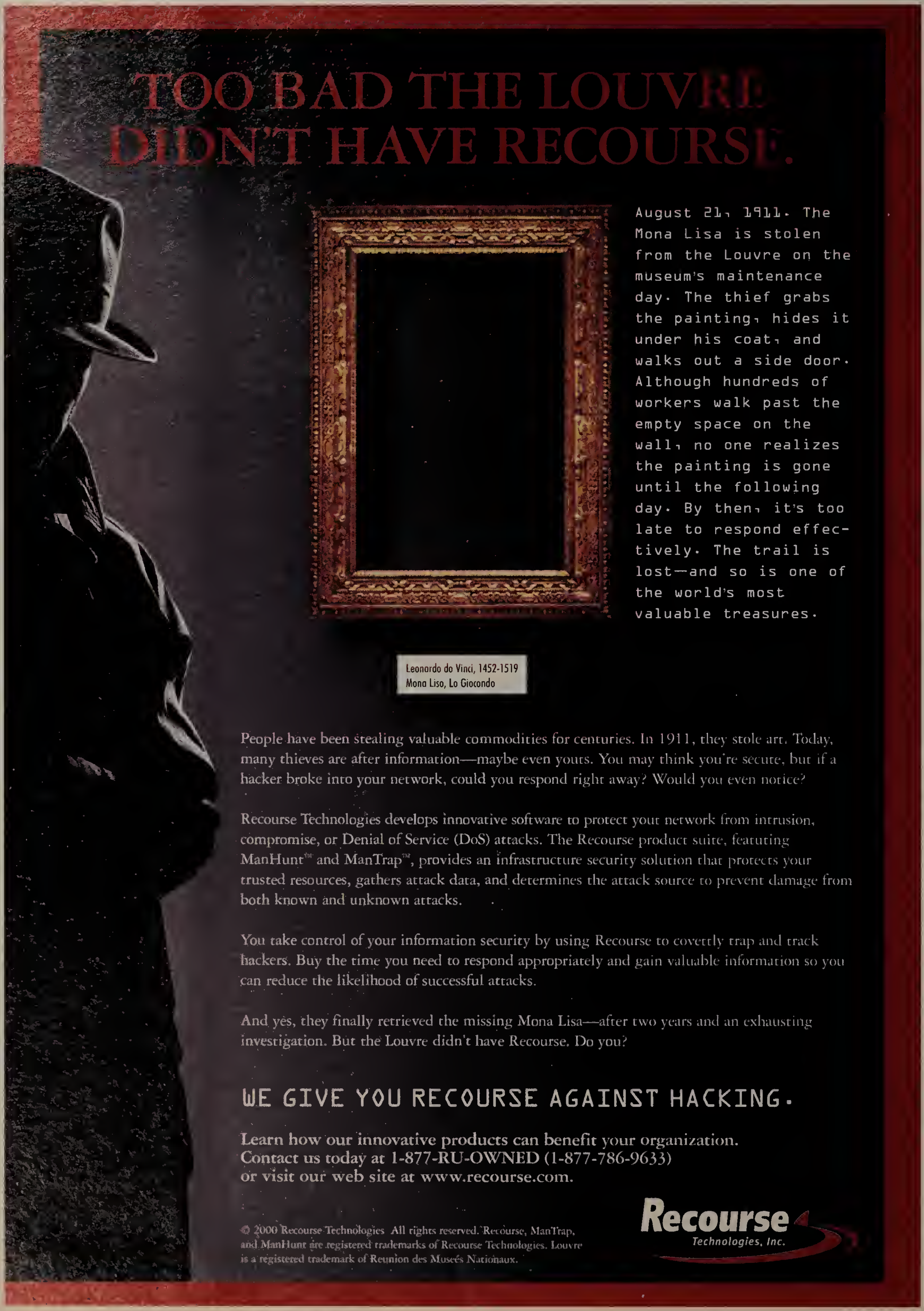
For all these reasons, CompTel in October petitioned the FCC to require a complete unbundling of all elements of Project Pronto, letting competitors choose the ones they like and add others at their discretion. In a separate proceeding, CLEC lobbyists convinced the FCC to consider forcing SBC to sell or give CLECs ownership of any copper loop it decommissions. That way CLECs could run DSL over "home run" loops from the central office to the premises with no remote terminals.

Now stop that!

SBC's response: Enough is enough. It claims it's the innovator, building an "overlay" on its telephone network to bring advanced services to the masses. Further restrictions will cause it to lose incentive, it says. That doesn't wash with the CLECs, which claim many of the remote terminals are just upgrades of old digital-loop carriers that blocked DSL signals.

"SBC likes to call this an overlay network because that rings as something completely new," Siegel says. "But the fact is, it's using as much of its existing network as it can."

If the CLECs don't get access to a big piece of that network this year, there could be a lot fewer CLECs in SBC-land when 2002 rolls around. ◪



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BY SUSAN BREIDENBACH

Controlling voice

An IP PBX or a VoIP gateway? **Making sense** of the voice-over-IP decision.

Evolution or revolution? That's the big decision to make as you move down the convergence path toward voice over IP to the desktop. Established PBX vendors such as Nortel Networks are marshalling a gateway-based coalition between the old and new, while Cisco and its IP forces are trying to stage a complete overthrow.

The debate has gone on for years in slide-show sparring duels, but it escalated into a real-world street fight when IP PBX sales started to increase this year. LAN telephony sales increased from $2.9 million to $40.7 million between the second quarters of 1999 and 2000, according to market research firm Synergy Research Group.

Cisco shipped its AVVID platform — the first enterprise-class IP PBX — in mid-1999, and 3Com has seen continued success selling its NBX line into small and midsize business sites.

"We started hearing more from the established PBX vendors in the third quarter of 2000, when the threats from these nontraditional players began to get real," says Jeremy Duke, Synergy's president. "This is a disruptive technology, and a big part of the PBX business has been flat or even declining."

The gateway approach to LAN-side voice over IP is more cautious and incremental, preserving investments in traditional PBX platforms and leveraging their vaunted stability and "five-nines" reliability. The PBX continues to handle call processing, while the line-provisioning functionality is off-loaded to the IP network.

A gateway board in your PBX packetizes and compresses voice for transmission over IP and functions as a proxy server and virtual line card for IP phones that are plugged into Ethernet jacks. A gateway card with 24 ports can support up to 96 of these phones, so you can squeeze more capacity out of a PBX by supporting new users through voice over IP.

In contrast, IP PBX systems replace the center-stage switch fabric in the traditional PBX hardware with the IP network and move the call processing to an open server — typically Windows NT. The call processing and PBX functions such as call switching, trunking and station access can be distributed across different platforms or even outsourced. Of course, this flexibility means increased complexity and integration overhead.

The PBX faction questions the reliability of the data infrastructure but acknowledges that properly configured Ethernet networks with state-of-the-art switches are approaching the same 99.999% uptime that voice networks have achieved. The weakness is the NT server, which tends to destabilize and requires regular rebooting. Traditional PBXs are comparatively closed, but will run indefinitely without rebooting and can be patched without disrupting operations.

Gateways enable telecommuters

Symantec is an evolutionist that has embraced the gateway approach to convergence, although the initial focus is on remote desktops. Located in the middle of Silicon Valley, where rush-hour traffic congestion is rising almost as fast as housing prices, the software developer needed a way to provide full PBX features over DSL lines to its growing population of home workers.

Because it had a fairly homogeneous voice network with more than 40 Nortel PBXs worldwide, Symantec decided to alpha-test a Nortel line-side gateway card to deliver voice over IP to telecommuters. A small hub is placed in each home, and users plug their computers and phones into it. Voice and data can be delivered simultaneously over the same DSL connection, so no second line has to be installed for data.

The employee has the same phone number at the office and at home, and the phones ring in both places when calls come into the enterprise PBX. The local and remote IP phones support the same functions, including call transferring, conference calling and message-waiting lights. The gateways provide four times the port density of a traditional PBX line card, so Symantec is using them for expansion on campus.

"There is a big cost savings when you don't have to buy another shelf in the PBX," says Neil Kole, director of communications and engineering at Symantec. There are also administrative savings because it's easy to install and move phones.

"You just plug them into the jack," he says. "With traditional phones, someone with the proper skills has to move a cable pair or do some programming on the PBX."

Kole says the latest upgrade removed the last perceptible imperfections in the voice quality of the IP phones, and he now has no reservations about rolling them out anywhere.

IP PBXs are another story, however.

"We played with an IP PBX, but we were concerned about the reliability issues. Even if I had a green-field opportunity in a new branch office, I would put in a PBX with a gateway card to deliver [voice over IP] to the desktop," he says.

Fomenting a revolution down under

In Wellington, New Zealand, Neil Miranda, IS coordinator for the Ministry of Social Policy, can't understand this halfway approach. The agency recently replaced a

Struggle summary

The struggle: Deciding between an IP PBX and voice-over-IP gateway

The opponents: Established PBX vendors vs. IP equipment makers

Outlook for resolution: Doesn't have to be an either/or situation, as even the vendors themselves are hedging their bets by rounding out product lines.

User impact: IP PBXs and voice-over-IP gateways are available for deployment, depending on your need.

nationwide network of 160 Nortel PBXs with voice-over-IP technology based on Cisco's AVVID platform. The infrastructure supports about 8,000 IP phones in more than 200 government offices and handles more than 150,000 voice calls each day. Except for Cisco's internal network, it is the largest deployment of AVVID soft PBXs in the world.

"Telephony is becoming a system," Miranda says. "You don't half roll out a new [human resources] or financial system, and it doesn't make sense to do so with a telephony system."

Miranda settled on convergence when the government decided to expand the agency from 6,000 to 8,000 employees but wouldn't budget additional funds for network operations. Combining voice and data into one infrastructure seemed the only way to achieve the necessary cost reductions.

The implementation took less than a month and required no end-user training. The network has been up and running for three months, and Miranda says his staff is fielding fewer complaints than it did when the old PBXs were in use.

"In addition to the efficiencies of having a single network, we also get so much new capability. The 'power of one' is starting to come together. I spoke at a recent [chief information officer] conference and told IT executives they need to embrace this technology now," he says.

Wireless LANs are ripe for convergence

But gateways still might be more practical in some specialized areas. Symbol Technologies in Holtzville, N.Y., has carved a nice niche delivering wireless converged voice and data to sites with mobility requirements, such as retail stores and hospitals. Wireless infrastructures are a lot more expensive than their wired counterparts, so users often have more upfront incentive to converge them.

Base stations mounted on the walls in a building create microcells with which wireless phones, PDAs and laptops communicate. Retailers such as Rite-Aid, Sears and May Co., find the setup ideal for taking inventory and keeping in touch with personnel roaming the sales floors. Hospital staffs use wireless devices to enter patient data or access information from anywhere.

Symbol provides its own handheld devices, which incorporate technology licensed from Palm and function as a phone, walkie-talkie and pager. At San Jose International Airport, American Airlines is trying them out for express check-in operations. Symbol works with voice gateway vendors to link its wireless voice/data LAN to a standard PBX.

The voice decision doesn't have to be an either/or one. While the official rhetoric is quite polarized, both camps are actually hedging their bets. Cisco champions the IP PBX concept but is also a leading provider of voice gateways. Nortel is developing its own IP PBX line.

Meanwhile, peaceful coexistence may be the way to go. If you have a huge campus that has maxed out the capacity on an existing PBX, you can expand via an IP PBX and use the old and new platforms together.

Breidenbach is a freelance technology journalist and consultant.

Expert insight

Go online for insight on the LAN telephony decision from Paul Strauss, a senior analyst with market research firm IDC.

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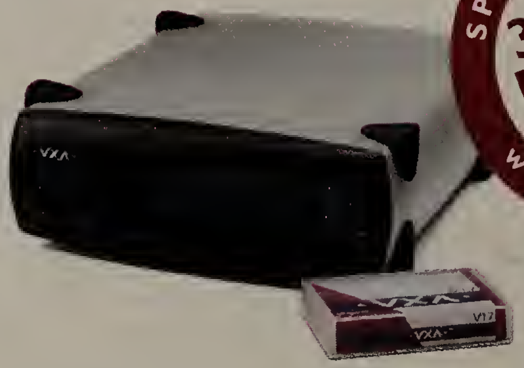

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Tech Data

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BY DENISE DUBIE

The management morass

The framework vs. point products **decision** remains a burden for network executives.

You wouldn't think too many choices could be a bad thing, but it is in network management.

Users are burdened by an overload of choices — frameworks from vendors such as Aprisma, Computer Associates, Hewlett-Packard and Tivoli; point products from companies such as Concord Communications, RiverSoft and Tavve Software; and, now, multipurpose suites developed by these same vendors. What users want, but aren't necessarily getting, is an end-to-end view across servers, applications and networks. They want network management systems that let them prevent, not just react to, problems.

That leaves framework vendors struggling to prove their usefulness, and point product makers striving to do more than just plug holes in frameworks. They all promise cure-all products, but no one can deliver one. "One-size-fits-all technology doesn't exist. That's not even true of pantyhose, never mind software," says Valerie O'Connell, a managing director at Aberdeen Group, a market research firm.

Frameworks that integrate point products will win, says Dave Ferree, an e-business director at Aptia, a systems integrator in San Jose. He points to RiverSoft's recent licensing of its Network Management Operating System source code to HP for use in OpenView. This will give OpenView Layer 2 topology capabilities.

"This was a good move because now HP can develop that capability into its products quickly," says Paul Edmunds, senior network analyst at Duke Energy, which uses OpenView and runs point products.

Struggle summary

The struggle: The market is teeming with framework and point product vendors offering stand-alone products as well as multipurpose software suites.

Examples of opponents: On the framework side, Aprisma, CA, HP and Tivoli; on the point product side, Concord Communications, Micromuse, RiverSoft and Tavve Software.

Outlook for resolution: Too soon to tell whether framework, point products or suites will win out.

User impact: Users have no clear choice. Framework providers have not been as innovative as point vendors, but point vendors don't have broad solutions.

Not so fast

But HP has gotten burned by teaming with a point product vendor, so other industry watchers aren't ready to declare frameworks the long-term winners. They point out that some HP OpenView shops that purchased supplemental Tavve management tools eventually replaced the framework product, choosing instead to rely on the point offerings for performance, root cause analysis and other management issues.

"Tavve developed products to aid HP OpenView, but those products ultimately replaced OpenView," says Frank Dzubeck, principal at Communications Network Architects, an industry analysis firm. Brand loyalty may be a thing of the past, he adds.

Framework vendors must change the perception that their offerings are as big as their names and as cumbersome to implement, says John McConnell, president of McConnell Associates, a network management consulting firm. "A lot of care and feeding goes into frameworks," he says, and that's when point products become appealing. Until, of course, the latest technology changes and users have to go shopping for more software. So both sides are putting together suites that address several needs at once.

But users can't simply adorn their infrastructures with the latest management products and expect positive results, O'Connell says. They have to think beyond network management to systems and applications management, and strategically unify business goals with IT management to determine what product is best. And that's not going to be simple. "Complexity is not going to be decreased by adding a forest of point products," she says.

O'Connell credits CA for getting product development right. It puts "all its products on the equal footing of Jasmine *ii*, going well beyond classic integration to architecture and design," she says. For example, the company recently released a suite of customer relationship management tools and integrated the new software with Jasmine *ii*, an e-business platform, and its Neugents technology. Because CA put Jasmine *ii* at the heart of all CA offerings, it doesn't need to force-fit products into a current trend, she adds.

As an example on the point side, Concord will periodically be releasing application software modules for its eHealth Suite of network and system management products. The first module, AdvantEdge for Exchange, shipped in November. It adds functionality for monitoring and managing Microsoft Exchange groupware applications.

Multipurpose suites, as good as they might be, don't really solve the bigger integration issue — something that can only be addressed through standards. But network management vendors are behind in adopting standards, Dzubeck points out. Framework vendors haven't accepted that they must standardize for the network management market to move ahead, but they will if they keep losing business to point product vendors, he adds.

Some believe the saturated network management market has paved the way for management service providers (MSP). With staff shortages and time crunches, customers of all sizes consider outsourcing an option.

But like framework vendors and point product makers, MSPs will come on strong, promising to do everything for you. Chances are, rather than clarifying your choice, they'll only muddy it more. ◪

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BY JOANNE CUMMINGS

Stuck in directory limbo

The **struggle** to understand directory services begins with knowing Microsoft's Active Directory and Novell's eDirectory, but **runs much deeper.**

Wouldn't it be nice if the choice of a directory service simply boiled down to choosing Novell's eDirectory (formerly NDS) or Microsoft's Active Directory? Pick one, get it up and running, and you're magically there. All of your applications have a place to go for identification, authentication, security and resource information. And because you're no longer burdened with redundant administration tools or management tasks, you've reached it: true network nirvana.

Sounds great. But then why are so many network managers still struggling in directory limbo? The problem, according to users and analysts, is that directory services have evolved within networks over time, leaving users mired in, well, network hell.

"As the industry has evolved, each application got embedded directory functionality," explains Daniel Blum, senior vice president at The Burton Group. "Yet the applications were managing duplicate or related information. In a large company, there may be more than 100 things you could call directories, and your name might be in 20 or 50 of them."

That can be costly. "There are huge hidden costs from redundant administration and unnecessary complexity," Blum says. "You have quality problems, where information is out of date. You have security problems, where people are able to access accounts six months after they've left. And you have application problems, where applications can't get data they need to personalize service."

The answer should be general-purpose directory services such as eDirectory or Active Directory, and in many cases, it is.

"The goal of an enterprisewide directory service like eDirectory is simple," says Chip DiComo, global network manager at Hellmann Worldwide Logistics, a longtime Novell shop in Miami. "It's a single source for everything in your network. It gives you one place to go to manage your entire IT environment, a prerequisite in a global operation."

But getting a multitude of directories consolidated in something like Active Directory or eDirectory is not easy.

"It's a huge re-engineering project," says Blum, who recently published guidelines for handling such a project. "The directories that need to be consolidated and integrated cross the gamut of corporate functions. They're in [human resources], security, customer-facing organizations, and in IT. It takes a huge cross-functional effort."

Top that off with integrating new applications, and the directory ordeal gets even worse.

Vendors just don't get it

"Even the vendors who have been in the directory space the longest have had trouble recognizing directory basics," says Dave Kearns, a consultant in Austin, Texas. "The current shipping version of Exchange uses a different directory structure than Windows 2000, and the current version of GroupWise uses a different directory system than eDirectory. In both cases, you need to synchronize between them, and that's not really the idea."

Users agree. "I've had to explain directory services to people who should understand them better than I do," Hellmann's DiComo says. "I'm tired of beating vendors over the head about this."

In addition to "just not getting it," vendors on the whole hesitate to write to directory services. "Vendors aren't willing to bet yet that there will be a [general-purpose] directory available where their products are installed," Kearns says. "And even if there is a directory, they aren't sure they'll be able to read and write to it. So they have to hedge their bets."

In some cases, this means just doing it the old way, writing proprietary authentication and directory-like services into their products. Or some have tried to play it safe by writing to the Lightweight Directory Access Protocol (LDAP).

When vendors write to LDAP, it means their applications should be able to use any of the major LDAP-compliant directories, such as eDirectory, Active Directory, iPlanet's iPlanet Directory Server or Critical Path's InJoin. This way, vendors are fairly assured their applications can run in a variety of end-user environments.

The problem is that LDAP is not that robust a standard, and every major directory service player has made its own set of proprietary improvements to the protocol.

"Developers can write to LDAP, provided they're just looking to retrieve some very basic information that's standardized across the different LDAP directories," Blum says. "But if they're looking to go beyond that, they can run into trouble."

Directory services vendors differ primarily in the way they allow modifications to the directory schema and how they manage access controls.

"If developers need to create nonstandard information structures and to change the directory schema, they are forced to write to a particular vendor's directory," Blum says. "Or if developers need to have special security roles to manage their application data, they need to manipulate the directory access control systems. That also means they need to write to a particular directory."

So what do vendors do?

"Having to write to three or four directories is a significant effort," Blum says. "And when they don't know which directory will be in the customer environment, some application developers may still be tempted to take the easy way out and keep their own directory functionality."

That brings us back to the start.

Users and vendors say a few things need to happen before we can successfully emerge from directory services limbo. First, users need to settle on a general-purpose directory and embark on that huge re-engineering effort to ensure internal directories are consolidated and integrated. Second, users need to insist that all vendors write to their chosen general-purpose directory, or at least to LDAP.

"When we look at new vendors, one of our first check-off items is to make sure they're directory-enabled," DiComo says. "If they're not, we write them off the list."

But most important, vendors need to standardize beyond LDAP's bare-bones functionality. "But they're not really moving in that direction," Blum says. "Microsoft isn't even participating in the [Internet Engineering Task Force] access control or replication work. And without it, the chances of standards are not great."

One area all the vendors seem to be pursuing is XML and its directory-focused extension, Directory Services Mark-up Language (DSML).

"XML is definitely an integration opportunity," Blum says. "It lets applications communicate more easily with directories. Rather than communicating data between applications and directories, you have applications and directories communicating metadata, or data about the data."

Blum says this would increase directory interoperability. "But someone still has to standardize the metadata," he says.

Currently, the major directory services players are participating in DSML.org, which is hammering out these standards.

"They're making progress, but they have a long way to go before they can achieve the ideal of making directories transparent to applications," Blum says.

That means users could be struggling with this for some time.

Cummings is a freelance writer in North Andover, Mass.

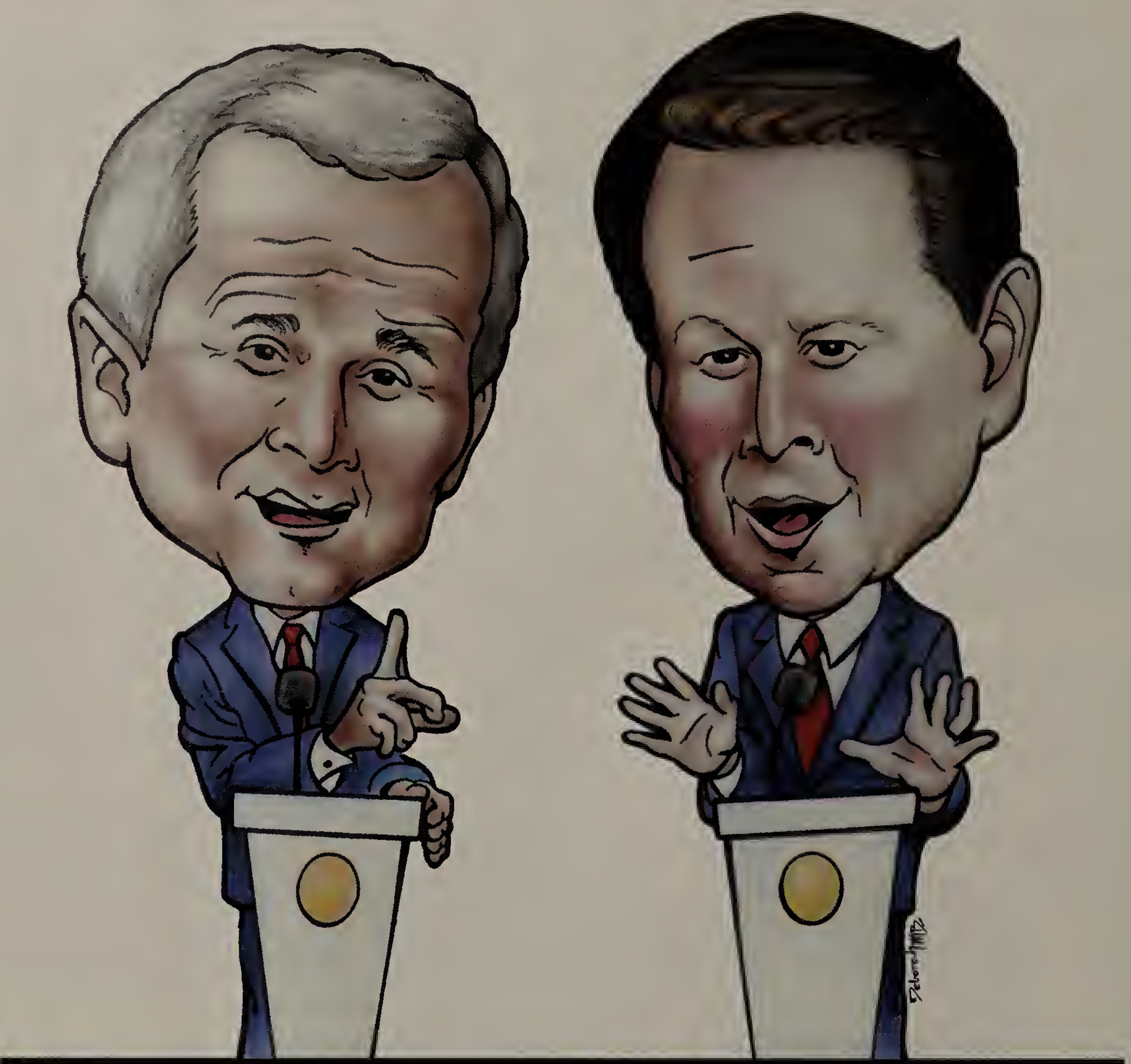
Struggle summary

The struggle: Users are struggling with the choice of enterprise directory service, the implementation and vendors hedging their bets on global directory standards.

The opponents: Users need to ensure that directory-reliant applications can integrate with their global directories. Without standards, vendors are hard-pressed to develop applications that comply with every flavor of directory.

Outlook for resolution: DSML.org might be the key.

User impact: Users need to work with what they have and urge vendors to support LDAP at the least, and more comprehensive standards, such as DSML, at best.



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BY JEFF CARUSO

Big bandwidth vs. QoS

Is it better to throw **bandwidth** at the network to handle growing applications needs, or is it smarter to add quality-of-service mechanisms? The **debate** seems to be fading.

In this classic contest between network brawn and brains, it looks like brawn has finally gained the upper hand.

Big bandwidth is simple and cheap. Managing bandwidth using quality-of-service (QoS) techniques — while a more elegant approach to network design — suffers from daunting complexity. Right or wrong, that's the general perception among network managers, and it's the perception that is influencing most buying decisions.

The argument for QoS has always been that certain types of traffic, such as voice and video, need to get through a network in a timely manner. So those real-time packets should be given a higher priority than the rest of the data, to make sure they have access to the available bandwidth.

The argument against QoS has been that if gobs of bandwidth are available, then prioritization isn't necessary. All packets will get the bandwidth they need.

The LAN side

The latter argument makes the most sense in the LAN, as the prevalence of Gigabit Ethernet at rapidly falling prices is giving desktops and servers more bandwidth than they could possibly use.

It's difficult to find network equipment that doesn't provide excessive bandwidth, says Stephen Hope, network consultant at Energis Integration Services, in Carrington, England. "Even entry-level equipment is wire speed."

"Most of our customers are going 'the bigger the better,' " says Brian Stengel, executive vice president of IntelliNet, a network management service provider in Cleveland. "Most of them are finding [big bandwidth] much easier to sell to management, plan with the applications teams, design and implement with the network teams, and operate with their management service providers or internal operations teams."

The WAN side

The argument for QoS continues to make more sense in WANs, where bandwidth is scarcer and more expensive than in the LAN. But even this is changing.

Buying more WAN bandwidth rather than a QoS device served the purposes of Gliatech, says Dave Bujaucius, the Cleveland biotech firm's senior IT manager. "We found that the difference between a fractional and a full T-1 was less than $100 per month," he says. "A QoS product would have taken several years to pay for itself, so we just purchased the extra bandwidth."

Of course, that's nothing compared with what may become available in the WAN at low cost in the next few years. The bandwidth available for the WAN is growing extremely fast, thanks to the "optical network revolution," says Dave Passmore, research director at The Burton Group.

SONET speeds over a single channel of fiber are quadrupling every two years, while the number of channels vendors can squeeze onto one fiber-optic line is doubling in that same time.

That means prices are bound to fall rapidly, as bandwidth gets less expensive and carriers start to undercut each others' prices. "It's basically an optical arms race," Passmore says.

This will likely happen everywhere except remote areas, which won't get access to fiber as quickly as metropolitan areas.

A matter of quality

But even if plenty of bandwidth is available, chances are that file transfers will at times encroach on voice and video traffic if QoS isn't in place. That's because TCP is designed to use all the bandwidth available to get the job done, says Mike Bass, principal network design engineer for a large interexchange carrier.

"No matter how much bandwidth you have, you will hit saturation peaks several times a day that last maybe only a few seconds each," he says. If voice calls are running at the same time, callers will likely hear skips or silence for those seconds.

Many users are choosing to take those chances. After all, cell phone users already put up with such poor quality.

But some network managers aren't considering QoS simply because they aren't ready to trust data networks with voice calls. Energis' Hope says a customer once posed the question, "Why would I want voice with the reliability of data?"

"This kind of — probably justified — paranoia is common and will persist for a long time," Hope says.

Making it work

For organizations insisting on putting voice or video and data on one network, the most prudent course of action might be to combine the two approaches. Instead of creating eight QoS levels for traffic of varying importance, create just two: one for voice and video, and the other for everything else. At the same time, continue to overprovision bandwidth somewhat. This approach adds only a little complexity, while making sure that skips and gaps don't creep into phone calls.

Visalia, Calif., is taking this approach. The city is linking its sites in a giant LAN, says Michael Allen, the city's IS manager. Voice will run over the LAN, and in the future, so will video-based training.

"The plans are to implement QoS for the voice side and not differentiate the data side with QoS," Allen says. "If it were data only in this high-bandwidth environment, we wouldn't bother with QoS." ◪

Struggle summary

The struggle: Determining whether to deploy quality-of-service mechanisms or use more bandwidth to handle increasing traffic loads.

The opponents: QoS advocates vs. bandwidth bigots.

Outlook: Big bandwidth is simple and cheap. Managing bandwidth using QoS techniques — while a more elegant approach to network design — suffers from daunting complexity. Right or wrong, that's the general perception influencing most buying decisions today.

User impact: If you're definitely going to put voice or video together with other data on your network, the most prudent course of action might be to combine the two approaches. Create just two QoS levels: one for voice and video, and the other for everything else. At the same time, continue to overprovision bandwidth somewhat.

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BY PHIL HOCHMUTH

Linux against the odds

Linux has gained some heavy backers, but still hasn't broken the enterprise. **Will it ever?**

The Linux open source operating system had a banner year in 2000, gathering one endorsement after another from top industry vendors — IBM, Dell and Oracle among them. But still, even with such heavy backing, Linux remains outside the enterprise doorway.

It's not that Linux hasn't put up the numbers. It was the second-most-shipped server operating system in 1999, behind Windows NT, with a market share of 24.6% vs. 38.1% for NT, according to market research firm IDC. Linux out-shipped Novell NetWare and all combined Unix flavors, each of which had less than 20% market share. IDC predicts that Windows and Linux will continue to be No. 1 and 2, respectively, into 2004.

If Linux is ever going to crack the enterprise, it's got the right names behind it now.

First to the party

Linux got its first big break from IBM, which announced its Linux strategy in the fall of 1999. Over the course of 2000, IBM invested $200 million in Linux, which is now available on the company's entire line of servers — from mainframes to PC servers. IBM also ported enterprise software products, such as its DB2 Universal Database and WebSphere e-commerce software, to Linux. And it offers technical support and consulting services for Linux.

"Linux has certainly made huge strides this year," says Dan Frye, Linux program director for IBM. Frye wrote IBM's first white paper on Linux in 1998 and helped forge the company's ambitious Linux strategy a year ago. "At the beginning of the year, IBM had 15 engineers working on Linux," he says. "Now we have over 100. Linux is as much a part of [IBM's server strategy] as the AIX and the OS/400."

Besides IBM, Compaq, Dell and Hewlett-Packard now sell Linux preinstalled on Intel-based servers and offer technical support for the operating system. Major enterprise software vendors, such as Oracle and SAP, have ported their premier database and enterprise resource planning applications to the platform as well.

These servers are being used a lot, but not for enterprise-class applications, says Dan Kusnetzky, a senior researcher with IDC. "People aren't going to be throwing out any of their current systems and replacing them with Linux."

The big pluses

For those who do consider Linux, cost, reliability and flexibility are favorites on the plus side.

Developers can download many Linux distributions for free from the Internet, and IT managers can buy enterprise editions from companies such as Red Hat and Caldera for less than $200. That compares with pricing as high as $4,000 for Microsoft Windows 2000 and as much as $11,000 for Novell NetWare 5. Because Linux is licensed under the General Public License, it has no restrictions on the number of users attached to a server or the number of servers on which a single copy of Linux can be installed.

Open source and Linux advocates such as Frye claim that the peer review involved in Linux developments makes the code more bug-proof and reliable than proprietary software. Plus, as an open source operating system, Linux is easily changeable. Developers can manipulate the code to make the software fit a specific function.

Being able to change server code is important to Maurice Smiley, a senior systems administrator with Gulf State Engineering, a Houston firm that designs equipment for the oil and gas industries. For two years, Smiley has run Red Hat Linux on the company's file, print, Web and database servers.

"The openness of Linux is important to us. If we don't like the way something works, we can just change it," Smiley says. "Almost none of the systems we run use stock Red Hat kernels. We grab the latest [kernel] and recompile it for

Struggle summary

The struggle: Linux has emerged as a legitimate business-class operating system, but no one is closing his Windows yet.

Opponents: Linux vendors vs. Microsoft, Novell and Unix companies.

Outlook for resolution: Analysts predict continued growth for Linux but say it will never dominate the industry.

User impact: Linux will continue to be a low-cost, low-end Unix alternative for users, but it will not be the answer to every IT problem.

what we need." But openness does have its downside, Smiley adds.

"The standards aren't rigid yet, and they need to get that way," he says, adding that Linux distributions can differ greatly among vendors and even between a single company's versions of the software.

Linux's openness is one of many factors keeping Microsoft from viewing Linux as a competitive threat in the large enterprise market, says Doug Miller, group product director for the Windows server market at Microsoft.

But Miller acknowledges that Linux could cut into Microsoft's market share for lower-end systems.

Take Smiley's Linux deployment as an example. Gulf State Engineering may be a Linux shop, but it's a relatively small company — the Linux servers support just 300 users.

The Gulf State Engineering implementation is typical. But for now, Linux is still used mostly for what IDC's Kusnetzky calls "infrastructure," or background tasks, in large companies. These tasks include file, print and Web services.

"Linux just isn't ready for every part of the enterprise yet," adds IBM's Frye. "If you're a really large enterprise that wants a 16-way or 32-way SMP [symmetric multiprocessing] box, then Linux isn't for you. Unix is still the answer there."

A workaround

But users can get around the SMP limitations, argues John Hall, director of Linux International, a nonprofit group that organizes Linux development efforts. Some government research facilities, such as Sandia National Laboratories in Albuquerque, N.M., and the Human Genome Project use Linux servers clustered with Beowulf technology to perform supercomputer tasks, such as simulated nuclear explosions and human DNA mapping. Commercial Linux cluster products are available from companies such as Linux NetworX, Red Hat and VA Linux.

Still, Linux falls short on other big corporate computing features, including an enterprise-strength "journal" file system for writing data to large disk drives, advanced system management tools and strong product support from hardware peripheral manufacturers, Frye says.

Too much to overhaul

Plus, while hundreds of Linux training and certification outlets now exist, finding qualified IT professionals — let alone Linux experts — is a difficult task, says Bill Claybrook, research director for Aberdeen Group. Shifting from Windows NT or NetWare to Linux is unlikely for most organizations.

"It would be a huge changeover for them," he explains. Claybrook adds that after the initial savings users experience with Linux's low price, the cost of maintaining a Linux-based network is the same as it is for any other operating system.

Michael McVaugh, a senior systems analyst with Sunoco, agrees that a wholesale systems change-out would be too much effort. At Sunoco's Philadelphia headquarters, McVaugh runs more than 150 NT servers in support of almost every aspect of the gas company's business.

"We had a few people look at Linux, but not officially," McVaugh says.

Sunoco needs a Microsoft-like cookie-cutter approach to servers and applications because it runs a lean support staff, McVaugh says. "It comes down to training," he adds.

What would it take for McVaugh to move to Linux?

"I guess Microsoft would have to sell it," he says. ◪

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BY DENI CONNOR

Storage standoff

Network infrastructure, storage start-up and Fibre Channel vendors joust over storage-over-IP **standards.**

A slew of storage-over-IP proposals have obsessed storage vendors for the past year, dislodging conventional ideas of direct-attached storage and splitting partners and competitors alike.

Heavy-hitting storage and network infrastructure players are sparring over four proposals for transporting storage data across IP networks. Observers say the battle will probably end in a standoff between three: the draft for SCSI over TCP (iSCSI) submitted to the Internet Engineering Task Force; the Fibre Channel over IP draft submitted to the IETF and ANSI; and the Fibre Channel Backbone proposal before ANSI. A storage network start-up's proposal, yet to be submitted in full to a standards body, doesn't have a chance, they say.

Amid the storage-over-IP standards wrangling, vendors that have partnered to deliver end-to-end storage solutions often find themselves at odds. Some are ready to adopt iSCSI, others favor Fibre Channel over IP and some, such as Dell, have thrown their money into upstart camps or haven't committed at all. Users are left sorting through the confusion.

The iSCSI camp

Backers of the iSCSI proposal include its originators Adaptec, Cisco, Hewlett-Packard, IBM, Quantum and SANgate. iSCSI specifies a way to transport data residing on SCSI devices natively over TCP. Until the arrival of Gigabit Ethernet, LAN speeds have been woefully inadequate for transporting this type of block data. Now that 10 Gigabit Ethernet looms on the horizon, the idea of moving block data over IP is even more attractive.

ISCSI makes no changes to standard communications or network infrastructure gear, but does require the addition of a Fibre Channel-to-Gigabit Ethernet router and software to take SCSI data from the storage device and transport it as IP data across the net.

The IETF is expected to adopt the iSCSI draft by the end of next year. Adaptec and Cisco are planning to ship iSCSI-based products by year's end.

But Adaptec and a few other companies say iSCSI needs more. They've extended the specification with SNMP management information bases, IP Security or an ATM transport protocol called the SCSI Encapsulation Protocol (SEP). For example, Adaptec plans to support the SEP-enhanced iSCSI specification. It and other companies undertaking similar developments are confident the products will work with iSCSI when it becomes a standard.

Struggle summary

The struggle: Coming to agreement on a standard method of transporting storage data across IP networks.

The opponents: Established and start-up storage vendors and network infrastructure equipment makers.

Outlook for resolution: A standoff between three proposals: SCSI over TCP, Fibre Channel over IP and Fibre Channel Backbone.

User impact: Ultimately, users will get complementary methods of storage over IP that meet networking scenarios. Until the standards wrangling ends, though, they must deal with a confused market.

Down the Fibre Channel

The opposing specification, Fibre Channel over IP, comes from Brocade Communications Systems, Gadzoox Networks, Lucent, McData and QLogic. Here, Fibre Channel frames are encapsulated in IP frames for movement over a Gigabit Ethernet, SONET or ATM LAN, WAN or metropolitan-area network (MAN).

Some vendors are selling prestandard Fibre Channel-over-IP products for joining geographically disconnected storage-area networks (SAN), and are claiming that the equipment will be software-upgradable to the standard when it appears in mid-2001.

Brocade and Gadzoox also are among a group of vendors that has submitted the Fibre Channel Backbone proposal to ANSI. Fibre Channel Backbone allows greater distance and higher performance than Fibre Channel over IP.

Each of these three proposals complements the others. For instance, a user might pick Fibre Channel over IP to connect SANs located in Queens and Brooklyn; Fibre Channel Backbone to extend the distance to Rochester, N.Y.; and iSCSi to transport storage data within a small office in New Jersey. However, only Entrada Networks has announced a switch that will incorporate all three specifications.

Odd spec out

The fourth proposal flies in the face of the rest. The proposal, called storage over IP, is a superset of iSCSI and Fiber Channel over IP. It comes from Nishan Systems, a start-up funded by Dell, Quantum, Siemens and Sun. Nishan says it will win the standards game, claiming that giants such as Cisco, IBM and Lucent just don't realize it yet.

Most competitive vendors won't comment publicly on Nishan's proposal, but say the company has alienated itself with its bluster.

Steve Duplessie, founder of storage analysis firm Enterprise Storage Group, is not so shy. "There's a large degree of wishful thinking on [Nishan's] part," he says. "It's not realistic to assume that any of the standards bodies are looking to create a single, unified standard for three effectively disparate topics. It is completely unrealistic to assume that one relative neophyte is going to change the way those bodies operate."

He has little doubt that iSCSI will ultimately win the storage battle. "But it's not a battle over what is best. It's about what vendor has the market swing to make it happen. Right now, that's Cisco," he says.

Where vendors stand Go online for a chart listing which storage-over-IP proposals contain storage and equipment vendors support.
Go to www.nwfusion.com
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To Duplessie, standardizing Fibre Channel over IP would be superfluous. "There are point solutions to solve specific problems that don't need a standards verification. CNT [a Minneapolis storage infrastructure company] sells Fibre Channel over IP and ATM," he says.

At least one user agrees. EchoStar, a satellite TV company in Denver, moves storage data across an IP MAN using CNT technology. "Our storage needs are growing at 400% to 500% [a year]," says Rick Nelson, an IT architect for the company. "We started designing our SAN two years ago. If we didn't have the capability then [because of no standards], we could have easily lost half our customers." ☑

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BY JOHN COX

The apps race

Sun and Microsoft are bitter rivals in the distributed network applications market. What are their latest **strategic moves?**

Sun and Microsoft are putting increasing pressure on enterprise IT managers to choose between Java and .Net, their respective technologies for building Web-based, distributed applications.

But not many are ready to settle on either Sun or Microsoft. The reality is, they're struggling to build distributed Web applications the old-fashioned way — with plenty of hard work — and to achieve some interoperability between the rival technologies. They're using tools that make sense for them given current technology investments and business goals.

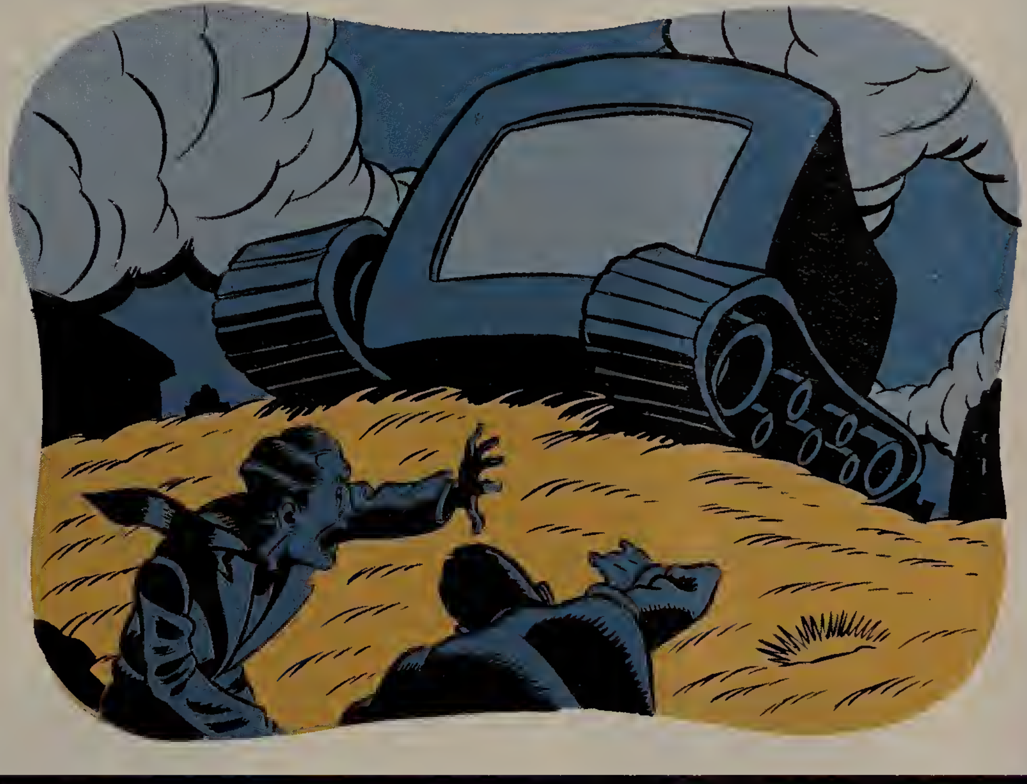
The Sun-Microsoft challenge — and the subsequent pressure on enterprise IT managers — began heating up again about six months ago. That's when Microsoft unveiled its .Net strategy.

.Net consists of four technologies. One is Visual Studio.Net, along with the .Net Framework and a new language called C#. This new language is based on C and C++ and, like Java, uses a virtual machine. Second are the .Net enterprise servers, including new versions of products such as the Microsoft SQL Server database. These are for running and managing .Net applications.

Third is a set of reusable ’Net-based services, similar to Microsoft Passport, that hold credit card numbers and other personal information. These services will save users from having to enter data for each transaction. Last are third-party end-user devices, ideally equipped with Windows CE client software.

Final versions for all .Net technologies are expected in 2001. For now, only the Visual Studio.Net beta tool set is available.

Initially, Visual Studio.Net will be used for building applications that run on Microsoft operating systems. Eventually, Microsoft says, .Net developers will be able to code in several languages, not just one. This will be possible because Microsoft plans on embedding XML, for representing and exchanging data over the Internet, and other Web standards, such as Simple Object Access Protocol (SOAP), in the .Net architecture.



Java, although it has matured dramatically over the past five years, still doesn't integrate closely with XML and other key Web standards. However, loads of Java development tools are available, and Java is the heart of application servers such as BEA Systems' WebLogic. These servers act as middlemen running Java software components and linking browser users with back-end corporate databases.

Market research firm Giga Information Group estimates that 35% to 40% of customers are adopting Microsoft products for low-end Web commerce sites. They're using Windows NT and Windows 2000 Datacenter Server operating systems, built-in messaging and transaction services, Visual Basic and Visual C++, the Component Object Model and Microsoft APIs. However, Giga drops the percentage to about 20% for sites with heavy traffic and high-transaction volume.

Microsoft hopes .Net will capture the attention of all users moving to the next level of Web development. It's already achieved surprising credibility among experienced programmers for its .Net strategy, sketchy as it is right now.

"If I'm becoming a 100% Microsoft shop, then .Net is going to become my platform of choice over time," says Greg DuPertuis, president of The Adrenaline Group, a Washington, D.C., firm that builds custom Web applications. "We'll keep working with Java applications on Linux and Solaris servers. We can do this knowing that those using Microsoft's .Net will be able to interoperate."

That interoperability will be possible, over time, as applications become "services," a concept that Microsoft and Sun advocate now. Under this model, application functions are accessed over the Internet using standard formats such as XML and standard protocols like HTTP.

Interoperability should become simpler because of emerging standards like Universal Description, Discovery and Integration (UDDI) plus XML and SOAP. You could create an application or service, and register it via UDDI in an online registry. Any other application can query the registry via XML, interrogate the object, then use SOAP to access it and XML to exchange data with it.

But today, with the ink on many of these standards specifications barely dry, most enterprise users will be building fairly conventional Web commerce sites, based on Web servers and application servers that run the business logic as a set of components and connect to back-end data and enterprise applications. ◪

Struggle summary

The struggle: Microsoft and Sun have increased pressure on enterprise IT managers to pick between their respective .Net and Java technologies for development of distributed Web applications.

The opponents: Microsoft vs. Sun.

Outlook for resolution: Microsoft and Sun are espousing "applications as services" models in which interoperability gets simpler because of emerging standards like UDDI, XML and SOAP.

User impact: Little for now, as most enterprise users continue building fairly conventional Web commerce sites based on Web and application servers that run the business logic as a set of components and connect to back-end data and enterprise applications.

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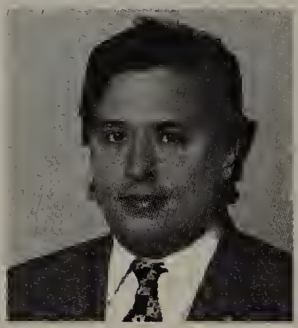

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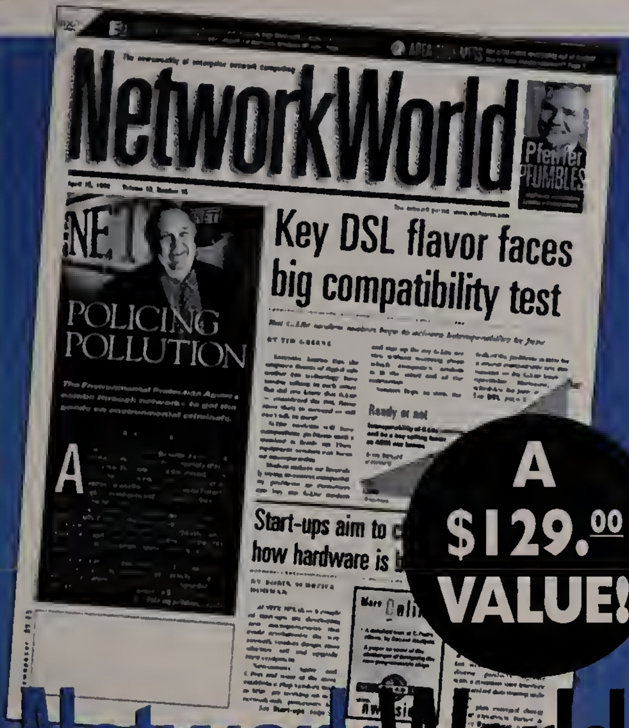

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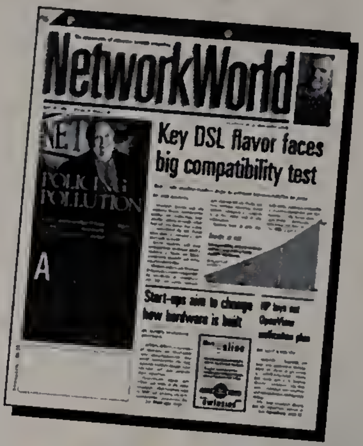
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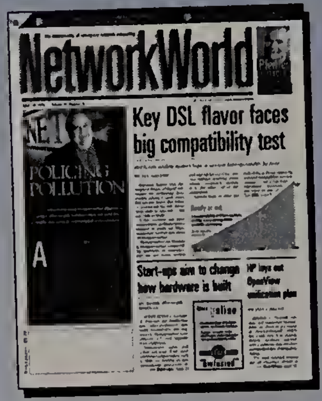
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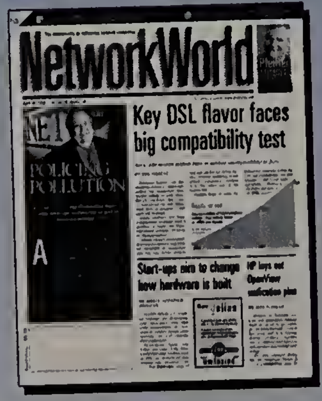
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Should users be allowed to add whatever they want to the network?

Permitting users to add software and devices to the network offers **benefits and risks.**

Yes BY MIKE LANE

ROBBIE MCCLAREN/SABA

While it may be extremely difficult for those wearing the IT hat to support users installing software on the network, that's the wrong perspective from which to view the question. If planned and implemented correctly, such a policy can work in an organized network.

The primary goal of your organization is not to have well-run systems. In most cases it is to make money, or maybe to provide information or a service. The IT department's purpose is to support and enable the company's primary function, including providing systems that help users do their jobs. However, what is good for the IT department — uniform, simple systems that are locked up tight — is not necessarily best for the company as a whole.

Workers always try to personalize their offices or cubes with photos, Dilbert cartoons, encouraging sayings and so on. This makes them more comfortable and increases productivity. Why should it be different with their systems? Goofy screen savers, stress-relieving games or software customized for their line of work make the office a better place to be, and happy workers are better workers. If your policies are too Orwellian, workers may even leave for friendlier pastures. It wouldn't be the deciding factor in a job move, but may tilt the scales the wrong way.

A second point is workers know much better than you do what software and applications they need. This is especially true in large, diverse organizations. You are not a CPA, lawyer, doctor or nuclear physicist — you know systems. The users know what functionality they need in their software. They probably know from word of mouth or professional literature which package is best.

I am not arguing for complete systems anarchy — that would be a disaster. However, letting users add software or devices to the network can work if you adhere to the following policies:

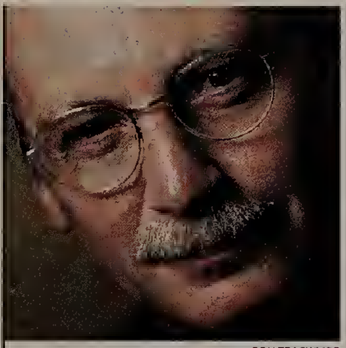
- Do not let users add pirated software or software that could result in lawsuits.
- Make users legally responsible for their own installations.
- Have departments pay for the resources they use — disk space, server processing time and bandwidth.
- Make it clear that IT doesn't support software it hasn't installed — IT agrees to keep the network up and servers running, not to fix some bug in a wacky piece of software.
- Forbid system killers, hacker software or programs that compromise company or systems security.

This works best as a partnership. Encourage users to regard you as a resource. They know the best software, but you know best how to set it up.

You can also help them in the selection process by explaining which software will work best in your environment.

Lane is a network engineer at Western Bank in Portland, Ore. He can be reached at mlane@westernbank.com.

No BY ROBERT O'CONNOR


DON TRACY/MPG

Users should not be able to add software and devices to the network without the network supervisor's knowledge or approval. I suspect that some may disagree, so let's look at how my organization's network is set up.

My department supports the administrative computing functions of Penn State University. This includes administrative applications developers, an enterprise server and many midtier servers. Our goals are reliability, availability, performance and security.

Our network has been designed to help us achieve these objectives. First, the network is modularized as much as possible. The connections are distributed in such a way that the likelihood of a total network failure is minimized. In case of a failure, it is easy to swap in a spare switch for the connections affected.

Second, all the connections use static addresses with known devices residing on these addresses. We know what is being added to the network and when it is added. Abnormalities are easier to trace when recent changes to the network are known.

Finally, the various functions supported are segmented with nonrouting subnets. By isolating the subnets, we prevent one subnet from impacting the performance of another.

One subnet is dedicated to departmental users and developers; another is the server subnet. This keeps undesirable protocols and traffic off the subnet supporting the production servers. A third subnet is for testing. The testing subnet lets us isolate new functions and servers so we can evaluate their impact on the production environments.

Performance is always an issue. To make sure users do not impact the servers, we've installed separate backbone connections.

Another consideration is security. Devices attached to the network pose a potential threat. Exposure to these threats comes in unexpected places. Most end users are unaware of how devices can be used for denial-of-service attacks or the ease with which the built-in security of some wireless devices can be circumvented.

The stability of the network segments is a major concern, due to the users we must support. On one subnet we have a large number of developers who cannot work without a functioning network. If a device were to be placed on their subnet that consumed an inordinate amount of bandwidth or caused a network outage, this would be an unhappy group. The server subnet must support 70,000 students. If these users cannot access the online student system, complaints come in quickly.

Letting users add software or devices without our knowledge would be an unacceptable risk. Mission-critical networks should be treated with the care they deserve. The cost of doing otherwise is just too high.

O'Connor is network supervisor at Penn State University in University Park, Pa. He can be reached at roconnor@psu.edu.

BY IAN LAMONT

Power at the negotiating table

The trick is knowing how to handle negotiations from the start.

Marlene Bauer of International Computer Negotiators warns that network professionals going into negotiations alone can be easily manipulated by vendors.

ROBBIE MCCLARAN/SABA

If you're like most network professionals, you view negotiating with vendors the same way you view going to the dentist: painful, but necessary.

But the pain from a bad contract can last years and cost thousands, even millions, of dollars. In a worst-case scenario, you could wind up buying gear or services your network doesn't really need or enter a relationship with an unresponsive or just plain bad vendor.

Frankly, too many IT buyers fail to employ good negotiating practices.

"We've gotten called in to undo a lot of [badly done] deals," says Marlene Bauer, director of consulting services for International Computer Negotiators (ICN), a Winter Park, Fla., firm that advises companies negotiating major goods and services contracts.

How do bad deals happen? Usually because the IT manager lets the vendor salespeople control negotiations or agrees to sign a standard contract. Standard forms are littered with disclaimers of liability, granting maximum protection to the vendor and minimum protection to you. A vendor contract will not include service-level agreements, solid maintenance policies and remedies if the vendor fails to perform unless you demand them.

You'll be amazed at just how rock-solid IT contracts can be if you take control of contract negotiations. It will also save you lots of headaches — and money. According to Bauer, a formal procurement process that includes the following power negotiating tactics can reduce costs by 25% over the long run.

Prepare, prepare, prepare

Do your homework before you begin discussions with a vendor, says Ralph Capio, an attorney with Armstrong Teasdale LLP in St. Louis and an instructor with ESI International, a Washington, D.C., consultancy specializing in contract management. "The better you prepare, the more likely it is you will succeed in the negotiation," he says.

Preparation includes determining what you need and what you can live without. Do you really require a five-year maintenance contract for a server you view as a temporary fix in an ongoing expansion? Or what about that groupware application a vendor is offering free for 180 days? Is that something you really want to bother with?

You also want to get an idea of what the vendor wants to accomplish through your contract. Is a hardware manufacturer looking to place switches it's planning on phasing out soon? Or is a new e-commerce applications vendor trying to establish a foothold in the market? In either case, the vendor would probably be more willing than usual to discount prices. It's up to you to know that and adjust your negotiating strategy accordingly.

"If you know your interests and their interests, you can look for that common ground that makes a win-win situation a possibility," Capio says. He adds that determining your vendor's "walkaway position" will help you bargain. Of course, skilled vendors will also be evaluating you and using this information to improve their negotiating leverage.

Establish a team

Creating a negotiating team with people outside of IT is a strategy many network managers find hard to swallow. After all, who knows the needs of IT better than you?

But flying solo into negotiations is a big mistake.

"A lot of times, the IT guys or women are out doing the deals on their own, and they are really outclassed when it comes to the negotiations," says ICN's Bauer. "They are great technically, but they just become pawns in the deal because they tend to be manipulated."

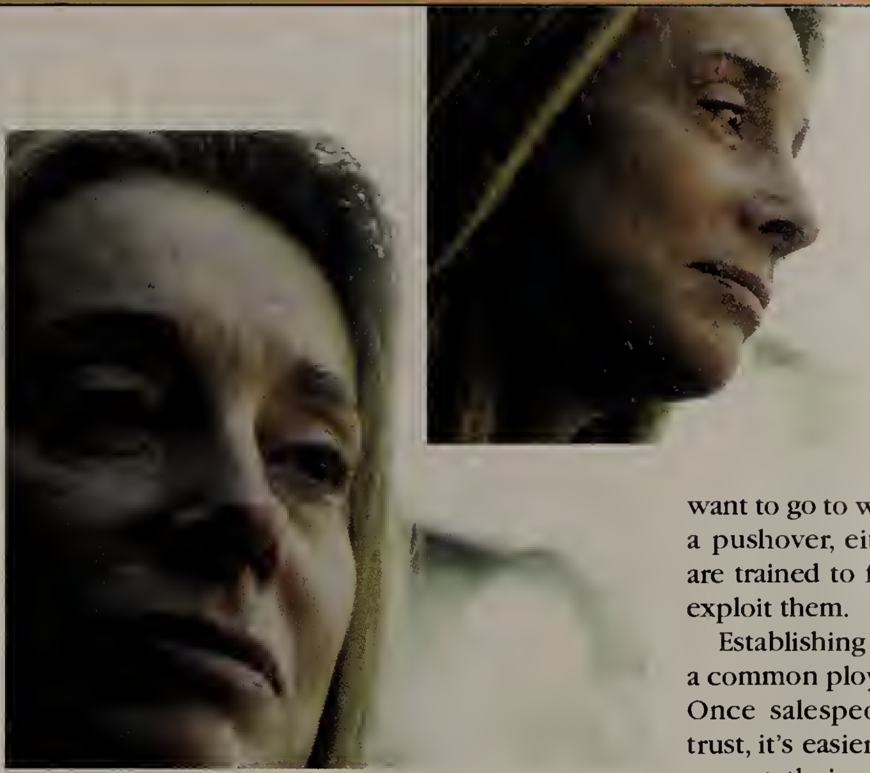
Bulk up your side of the table with an experienced negotiator — such as a procurement officer — and a team leader who can prioritize project needs and translate them to a list of contract terms, she says. If you are not the team leader, you should definitely be in a strong advisory position. The team should also have someone from the legal department, a user representative and even a human resources professional if the product being negotiated will require the transfer of people.

Stay one step ahead of the vendor

Demand to see a vendor's standard contract upfront. A good practice is requiring vendors to submit contracts with their initial proposals.

Be prepared to meet some resistance. Salespeople often don't let you see the contract until late in the game; they either dismiss it as a mere formality or wait until you are so excited to get the goods that you will turn against any colleague — including the company attorney — who dares to question the deal.

When you get the contract, make sure it includes everything you've asked to be included. Don't be surprised if your trusted salesman neglects to attach equipment schedules, software and maintenance agreements or other crucial supplements.



Make sure everyone on your team understands what is in the proposed contract before sitting down at the negotiating table. This is also a good time to have your company's legal department prepare the changes you want to see in the contract. Don't be afraid to bring up these changes during negotiations. "It's amazing how many customers don't even realize how much leverage they really do have and the kind of things they really can ask for," Bauer says.

Last, if you hear a discrepancy during the presentation, don't hesitate to say "we want that written into the contract."

Don't fight your vendor

Some customers mistakenly treat negotiations as they would a war and the vendor the enemy that must be crushed.

"Sometimes we define a win only in terms of somebody else's loss," ESI's Capio says. "Now your interests don't entirely coincide, but if you approach it as an adversarial event, then you are more likely to strike a win-lose posture, as opposed to a win-win."

Power at the negotiating table doesn't mean beating a vendor over the head, agrees Rich Glasberg, director of data communications for the Commonwealth of Massachusetts and a veteran negotiator for network goods and services. "The worst thing you can do is start negotiations on a bad note, treating the vendor as if it owes you something. There is no benefit to going in and closing the doors and butting heads."

While you don't want to go to war, you don't want to be a pushover, either. Good salespeople are trained to find your soft spots and exploit them.

Establishing a personal friendship is a common ploy for lowering defenses. Once salespeople have gotten your trust, it's easier for them to get you to accept their word on technical and legal points.

Whatever you do, don't say you're in a hurry to get the gear. If you do, you become a victim of a trap you've set. All it takes is a few well-chosen words — "The factory tells me it has that item with the specs you want, but they were going to ship it to a customer in Pittsburgh next week" — to get you reaching for the pen. The terms are never ideal, but who wants to wait another six months for a piece of gear that should have been installed yesterday?

Furthermore, no matter how competent or up to the task the vendor seems, don't tell the vendor it's got your business until you put pen to paper. "Once you award the deal [verbally], you lose leverage," Bauer says.

What's the best way to slam on the brakes when you're feeling rushed by the negotiations? Step back and remove the sense of urgency created by yourself or the vendor.

Be flexible with deadlines, and ignore those brought up by the salesperson. If you are unable to do this, or if the salesperson still tries to rush you into closing the deal, it's best to go to the vendor's top-level management. This tactic is also good when lower-level marketing people are dragging their feet, playing games or are otherwise unresponsive to your needs.

Remember, pushing for what you want might not be pleasant, but your smile will be brighter after the contract is signed. ◪

TOP NEGOTIATING MYTHS

MARK BETCHER

"We're giving you our best price."
Don't think for a second that you're getting the best price by virtue of your firm's size, long-term relationship with the vendor or anything else. A statement like this is meant to discourage you from bargaining down the price, plain and simple.

"We don't need to write that down."
This chestnut often involves a "personal" relationship between a well-trained marketing person and the customer's key manager. After trust has been established, the latter will be willing to accept anything the salesman says. But once the relationship ends (usually when one of the two parties gets promoted or leaves the company), the customer is stuck with the vendor's one-sided form contract.

"We can negotiate later."
Give your assent, and you can kiss any future negotiating leverage goodbye.

"We'll do anything for our valued customers."
Not if it isn't in writing. If the vendor insists it's sincere, then it should have no problem changing the contract to reflect this wonderful attitude.

"The price is going up next month."
Hinting about an imminent price rise is a scare tactic designed to insert a sense of urgency into the proceedings and encourage you to sign the contract without proper evaluation or negotiation.

"Try it out free for 90 days — there's no obligation to buy."
Who wouldn't want to get something for nothing? But don't think it's free. At the end of the trial period, you'll hopefully be so dependent on the product that you will not only have to buy it, but also not even consider what the competition has to offer.

The Power Issue

EXECUTIVE PROFILES

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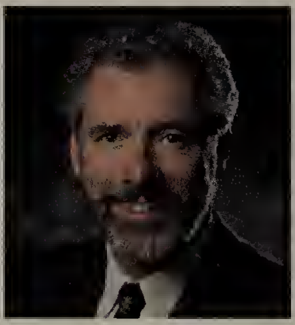

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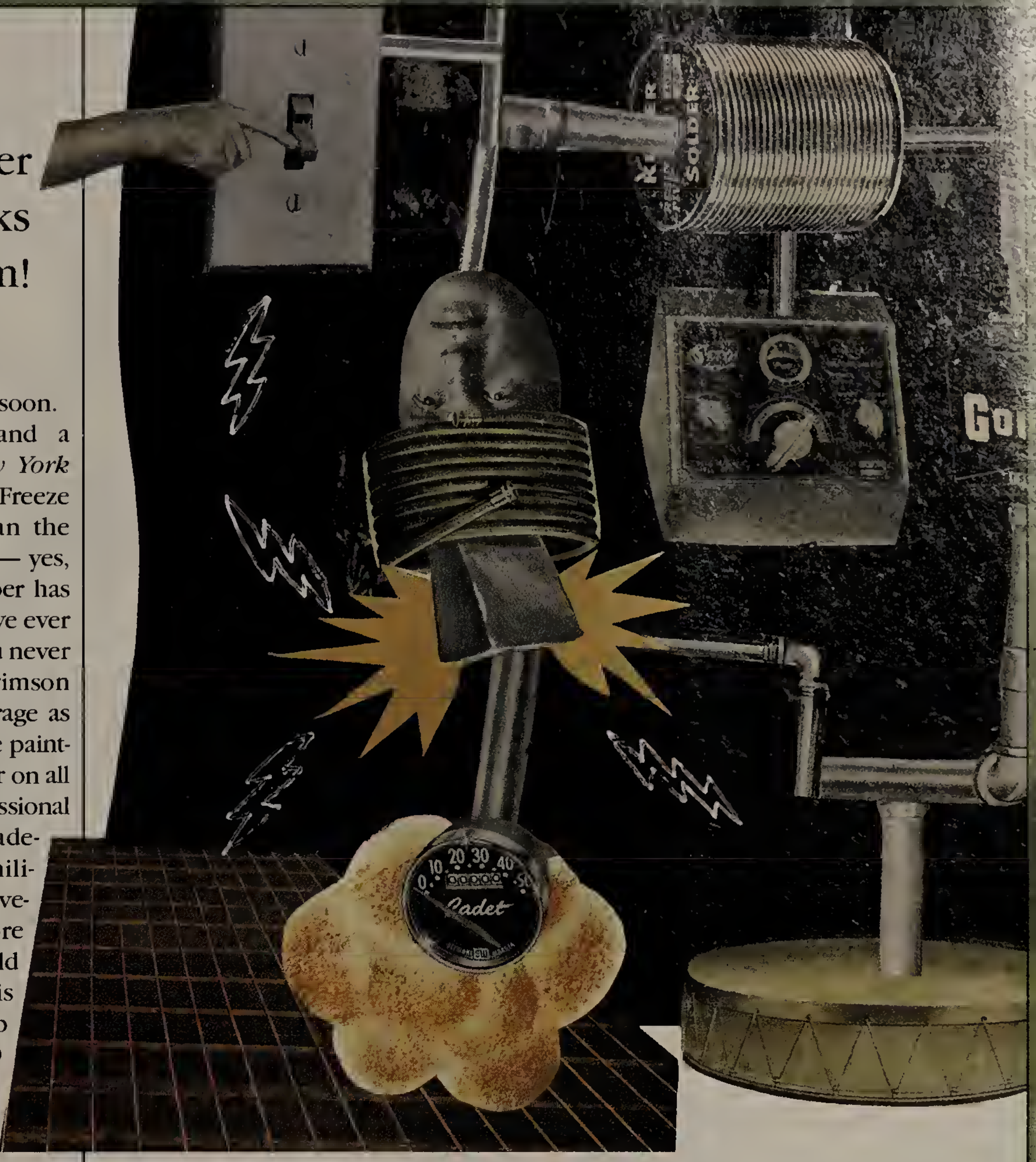
You're going down

10 surefire ways to lose power

BY PAUL MCNAMARA

Sometimes losing power is like being in a car wreck that knocks a transformer off a utility pole: Bam! Sparks fly, and the lights go out.



Other times it's like you've turned into an aging heavyweight throwing punches that just don't hurt anymore.

Losing power at the office can go either way: in the blink of an eye, or so gradually the victim doesn't realize he's a has-been. Some of the following examples come from headlines on network industry players. Others you've witnessed in your own company. In either case, they are guaranteed to snuff out power.

1. Take over at a household name with a legacy of technological wizardry. Miss the boat on a make-or-break market shift. Drive Wall Street daffy with earnings warnings and scattershot recovery schemes. Watch your market value plummet 70% over three dreadful years. You're going to take a powder, all right: Ask former Lucent CEO Rich McGinn.

2. After finally making it to the top, you call your first executive team meeting. You scan the room and see not only anxious looks, but also claw marks — a sickening collection of ugly claw marks. These people have long memories, so don't plan on getting their backing anytime soon.

3. Put on slippers and a bathrobe. Fetch *The New York Times* off your front lawn. Freeze in your tracks as you scan the front-page story about you — yes, you — and realize the paper has talked to every enemy you've ever earned and a half-dozen you never dreamed existed. Turn crimson from embarrassment and rage as you realize these people are painting you as a pathological liar on all matters personal and professional — family background, academic accomplishments, military record, business achievements. Fibs, fibs and more fibs, chronicled for the world in excruciating detail. This image does not build job security when you're CEO of an IBM subsidiary, as ex-Lotus boss Jeff Papows knows.

4. Develop a reputation as a Java visionary . . . and a taste for Internet chat rooms. Strike up an exchange with who you think is a 13-year-old girl. Arrange to meet "her" at an out-of-state location, where you learn that your online friend is actually a grown-up FBI agent. Get busted, fired, tried, convicted and sentenced to home detention before you can say "write once, run anywhere." Former Infoseek executive Patrick Naughton now writes software for law enforcement as part of his probation.

5. Just one time. You may be a teetotaler 364 days of the year, but make a drunken fool of yourself once at a company Christmas party and you might as well polish up the ol' resume. You'll have all the power of near-beer from that day on. Oh, your co-workers will tell you it was really no big deal. . . . They'll be lying.

6. Be an assertive No. 2 guy at a company where the No. 1 guy is a megalomaniac who collects yachts and yes men. Former Oracle President Ray Lane will tell you what this does for one's power. Someone's got to go, and it won't be the guy with the bigger boat.

7. Rile 'em in Redmond. You've built a "wunderkind" rep in a rocket ship of a company on the merits of a revolutionary technology — oh, let's call it a Web browser. Microsoft develops a knockoff and starts giving it away for free. Only time stands between you and a major power outage. Marc Andreessen and those who fondly remember Netscape can bear witness.

8. Fail to pay attention to the little things: Leave your résumé on the copy machine; tell a dirty joke within earshot of the CEO's prudish secretary; let the boss catch you doodling during his budget presentation; or make the local paper for shoving a Little League ump. . . . You don't have to slam onto a rocky shoal to lose power.

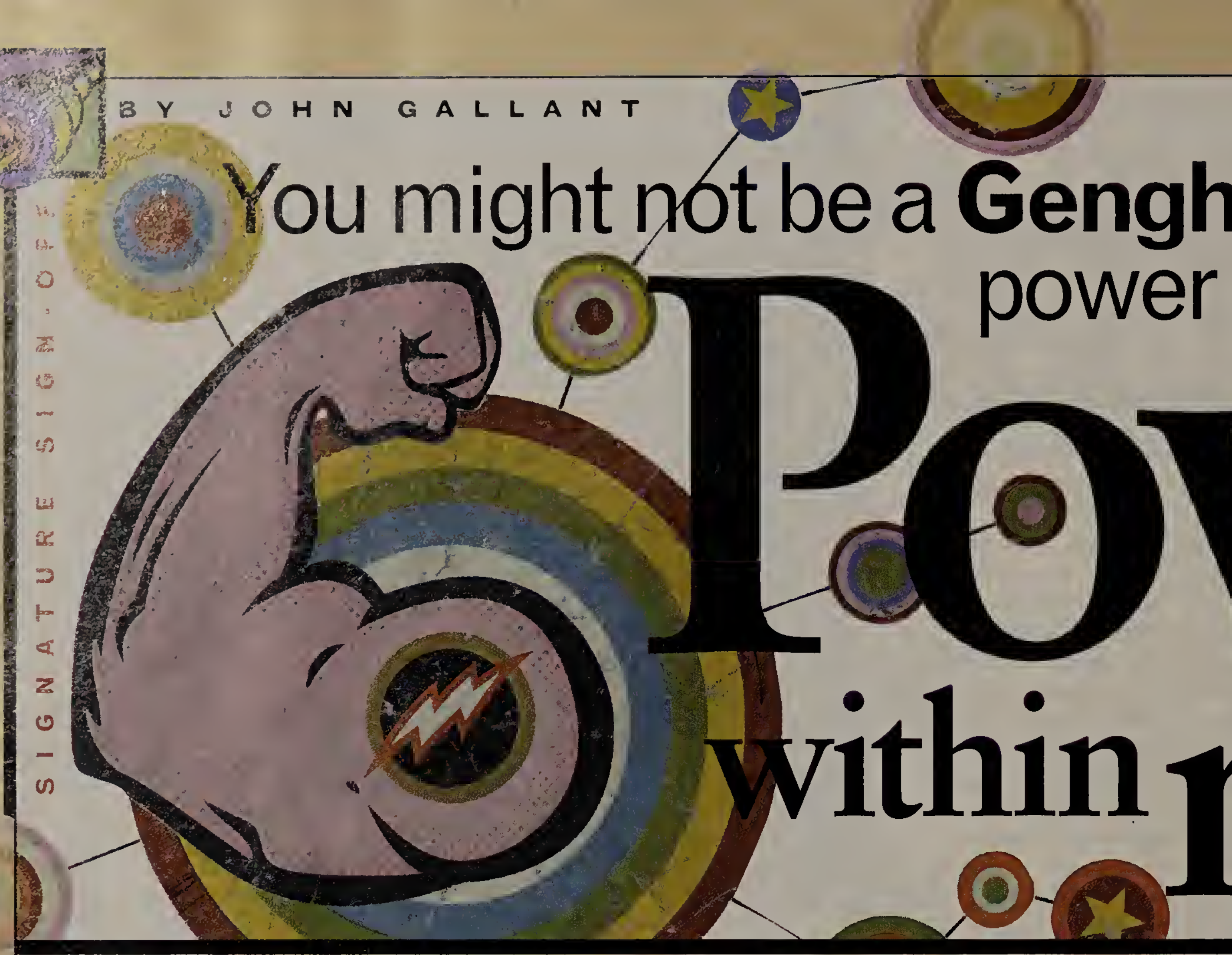
9. Ride Novell and NetWare all the way to the bottom of the deep blue corporate sea. You really can't help yourself. You grew up on NetWare and launched your executive career when it was the be-all and end-all network operating system. You'd rather renounce your citizenship than switch to Windows, and you don't have the stomach for Linux. You're going down. The only question is when.

10. Decide that space aliens have visited our planet and that the day is fast approaching when the known laws of physics will no longer preclude us from visiting theirs. Post your thoughts in a manifesto on a personal Web site called "The Quest for the Truth."

Go ahead and enlighten the masses, if you're like former USWeb CEO Joe Firmage and have already made your millions. If not, you might want to avoid this particular power faux pas. ◪

SIGNATURE SIGN-OFF

BY JOHN GALLANT


ALLEN CRAWFORD

You might not be a **Genghis Khan,** but power can be yours.

Power within reach

When I was 19, I bench-pressed 200 pounds.

That may not sound like a lot if you're the Charles Atlas type. But I had lifted weights for a couple of years and always struggled with that particular exercise — the sine qua non of aspiring middle linebackers. I got the bar off my chest once and ... well, that was it. My spotters hoisted it back up because I was, as Austin Powers would say, spent.

At the time, my conception of power was centered on the physical aspects of the term. Hey, it's a guy thing. Don't get me wrong, it's not that I didn't value intelligence — I was actually also working my way to honest-to-goodness Phi Beta Kappa status. But I valued strength and physique and, I'll admit it, that swagger that the really cool athletes seemed to adopt so naturally.

If I bench pressed 200 pounds today, it'd be nothing short of a miracle. Something like if my son is ever trapped under our Explorer or one of those burning logs you see on old TV dramas. No doubt, I'd toss off the dead weight in a single, beautiful adrenaline burst that would make even the Incredible Hulk jealous (I'm not sure my son would want to bet on that).

In any event, along with my physique, my perception of what it means to be powerful has changed many times over the years.

I've learned that power can be the God-given ability to rally people behind ideas and beliefs. I've seen this power in charismatic CEOs and technologists who have convinced employees that they are working on something that will change the world. Think Bill Gates, John Chambers, Andy Grove. I've felt it in talking with them. I believe! I believe!

Power is the ability to get venture capitalists and other moneyed folk to bankroll an idea, a vision, you. The ability to manipulate funds beyond my own limited imagining to create something new or to amass a collection of companies that reshapes the market. Think Bernie Ebbers, Jim Clark.

Power can be the ability to convince others that you can see the future — the future of technology, society, the stock markets. You can make a damn fine living telling others what they ought to be doing and, unless you are a stock analyst, people rarely check back to see whether you were right.

GEORGE TOOMER

Power can be the sheer force of will. Of pushing yourself and others around you to work harder and smarter and simply outdo the competition. I work a lot, but I look like a piker compared to the hustlers out there looking for their first big break or trying to make the second or third one.

Perhaps you are already the Genghis Khan of the heartland, the Winston Churchill of the IT department, the Michael Milken of the networked world. Perhaps you just don't have it in you to achieve such stature. But that doesn't mean power isn't within your reach. We all have the power to think clearly.

Sounds obvious? But it's rare. This has become eminently clear to me in observing the gyrations of Wall Street in the past couple of months. Each day, the Nasdaq composite — the heart monitor of our tech world — has jumped up and down in frightening ways. And each night, the experts tell us why.

But that isn't knowledge or insight, it's color commentary — like Dennis Miller's toss-off about how the Giants' nickel defense compares to the Spartans' last stand at Thermopylae. We listen to these experts and nod our heads, but they aren't explaining anything, they are rationalizing, filling airtime with instant analysis of forces beyond their understanding and ours. They are looking backward, not forward.

The same thing happens every day with the technologies and the market shifts that shape our businesses and professional lives. IP is the future. Application service providers will change everything. Optical is the hottest thing going. Wireless is the next big wave.

But the people who are pushing these things — with rare exceptions — are jawing about what has taken place or what they fervently hope will happen. They aren't explaining what is really happening.

Why?

It's too hard to do. We are pigeonholed and over-busy and few of us take the time to truly analyze anything, to study something and find out what it really means. Or to find the people who have analyzed things.

Recently, I treated *Network World* columnist Tom Nolle, president of technology assessment firm CIMI Corp., to a cheap dinner at Outback. In return for my largess, I got a view of the optical marketplace that shook up my pat notions and helped me better understand what's likely to happen in the future. That's because Tom, who can be quite the curmudgeon, has done his homework and can see the holes in the gold wrapping paper.

It has been my good fortune to cultivate sources like Nolle over the years and to help make them part of the *Network World* team. These are the people who remind me that I am not as "with it" as I'd like to think.

You can do the same thing. Find people who challenge the popular ideas and strategies — read what they write, listen to them speak. Find people who think unconventionally and you will find yourself thinking that way. Force yourself to ask some basic questions: How will you make money? How will your vendor make money? Where will the technology go if you push it to its limits?

It's hard work, but it makes you powerful. It makes your decisions stand the test of time. It makes people listen to you — even if you can't bench press your own weight.

Gallant is editorial director of Network World.

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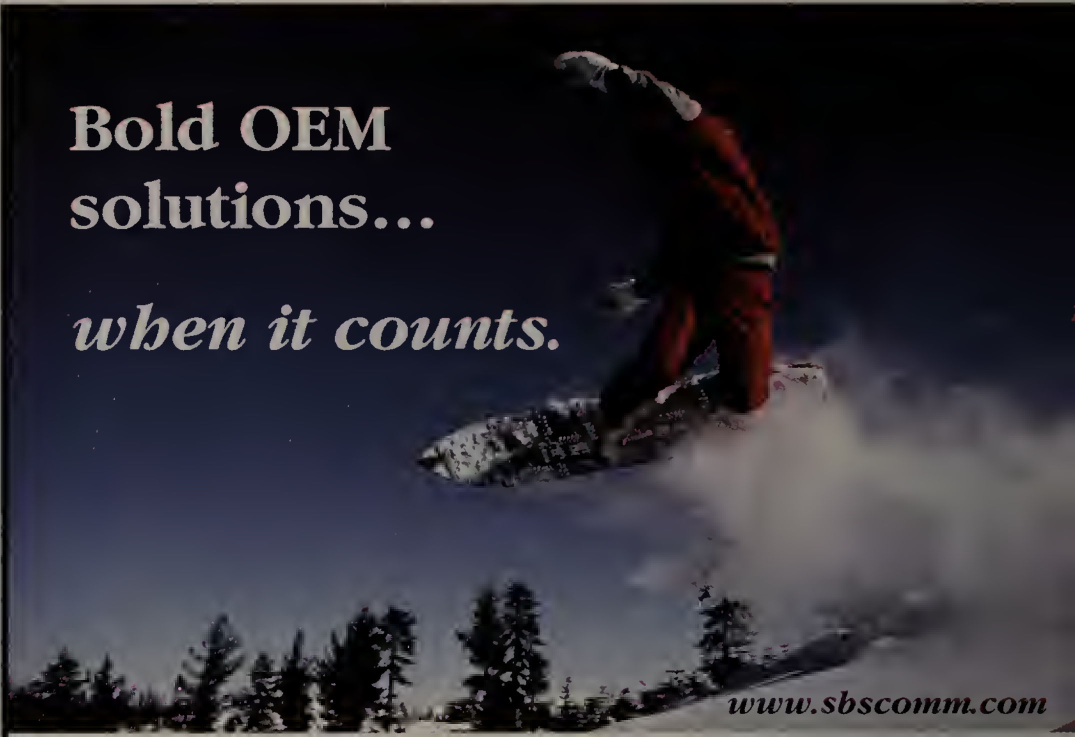
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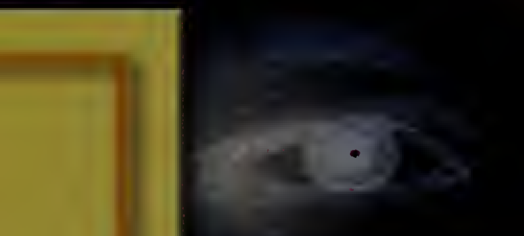

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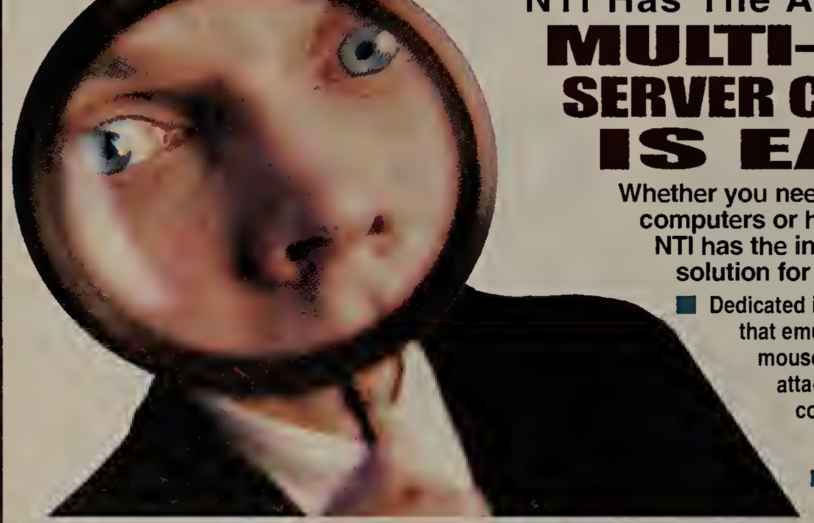

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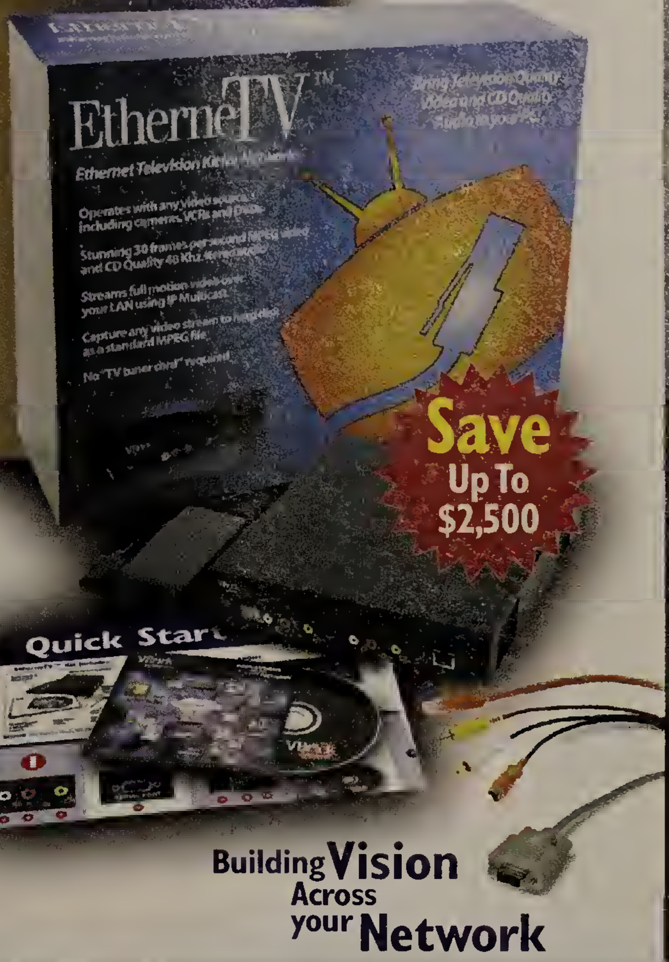

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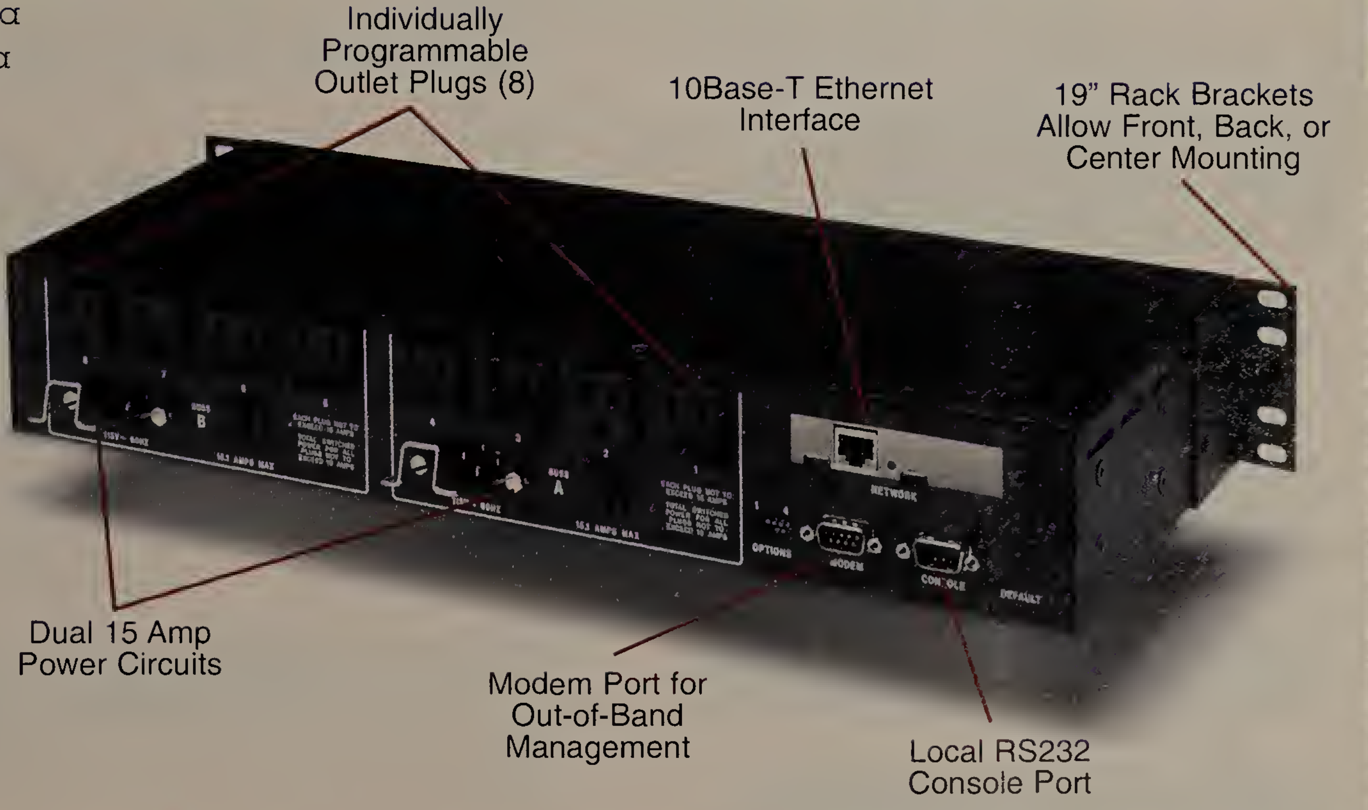
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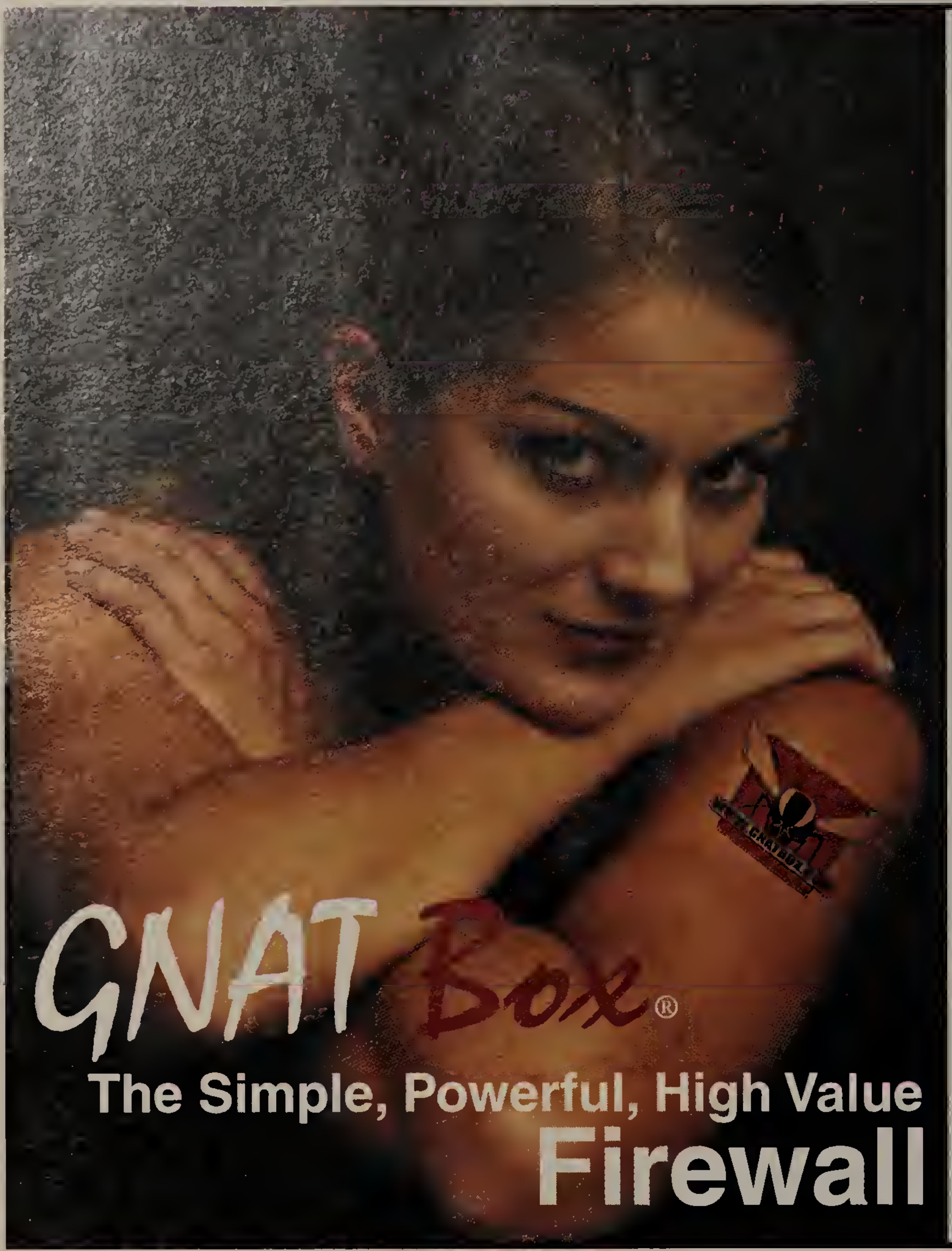
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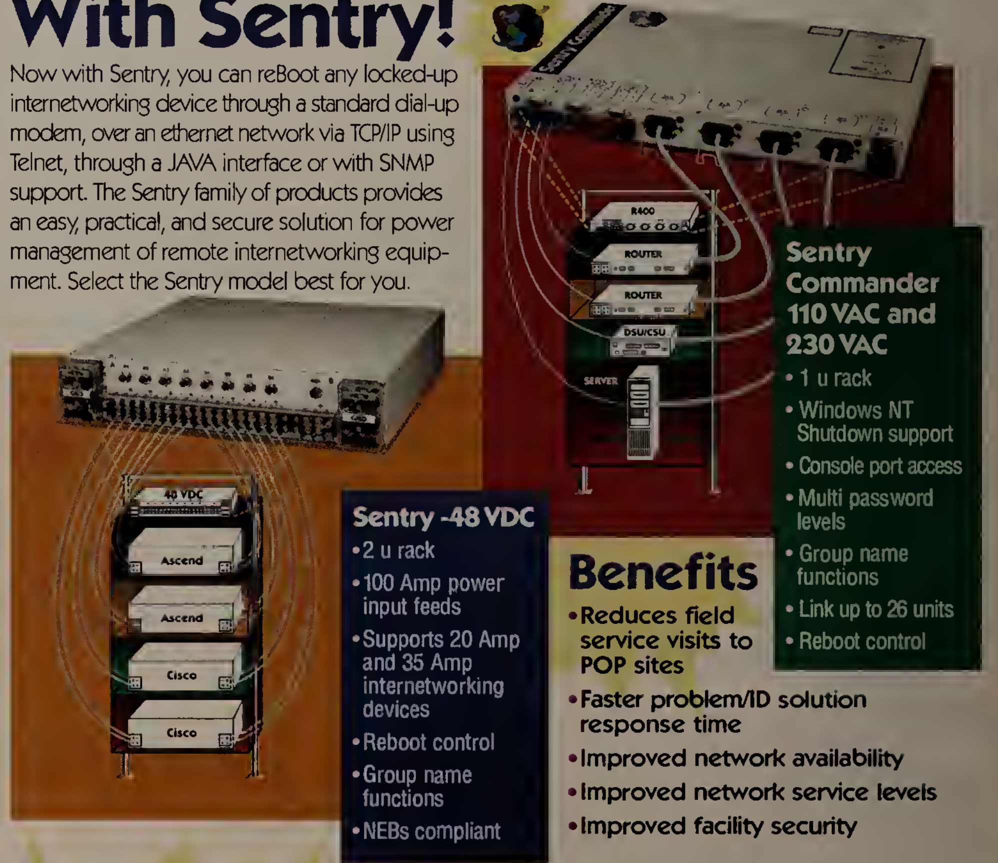

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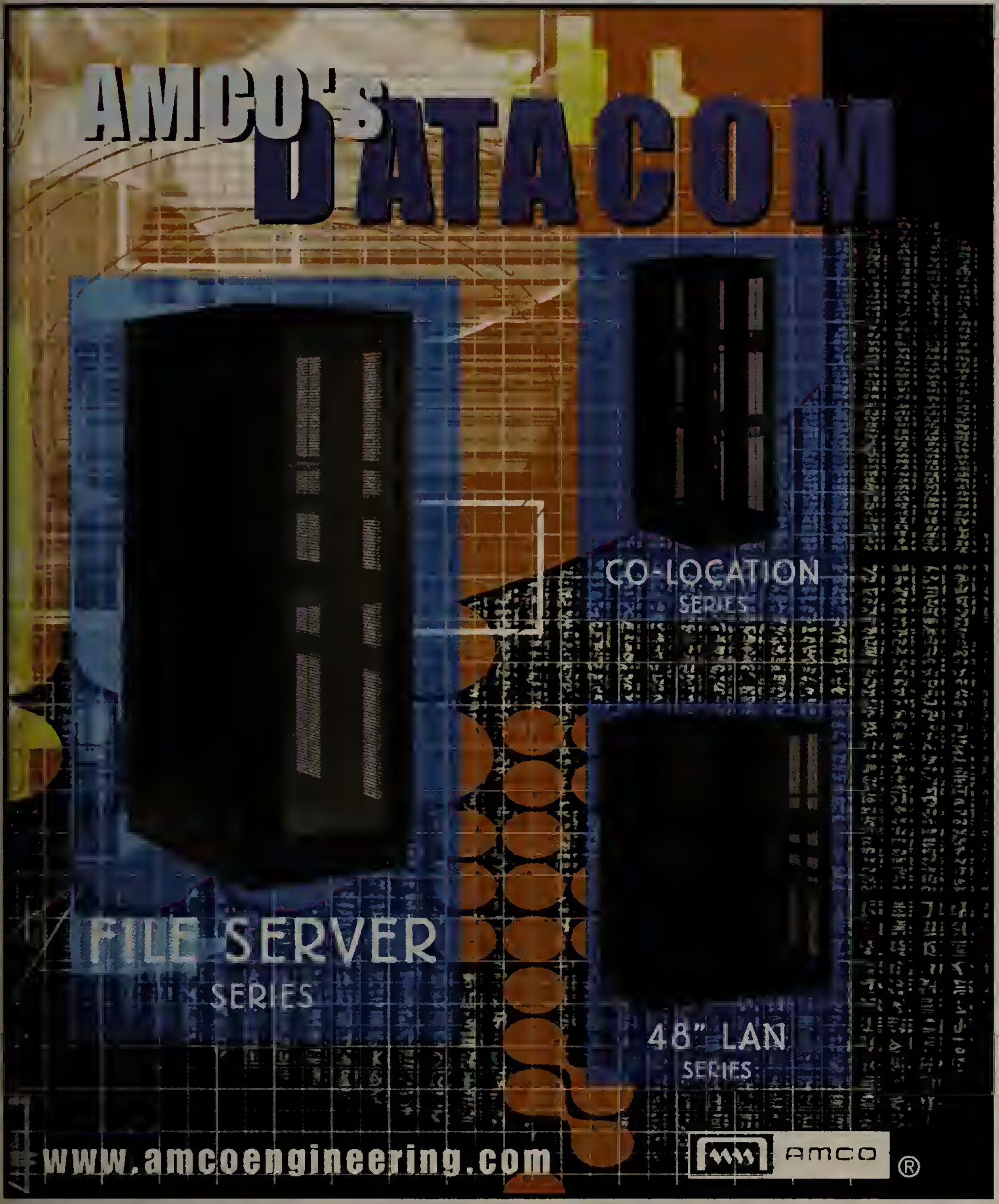

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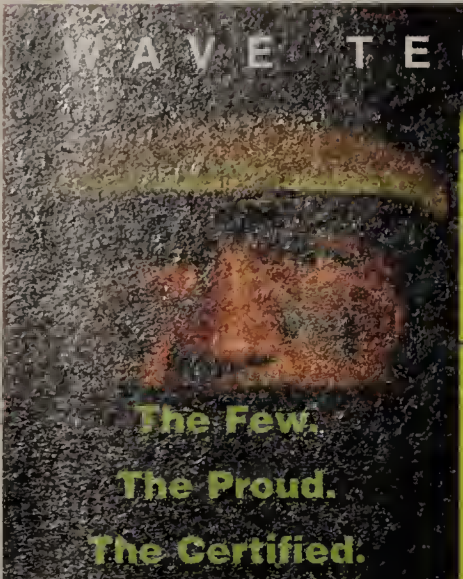

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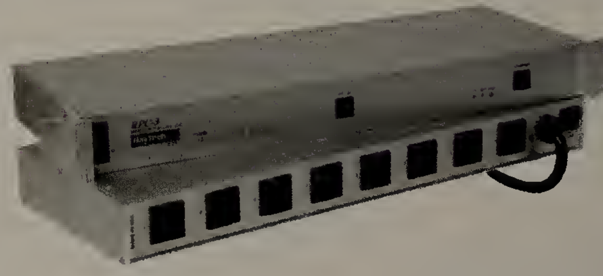

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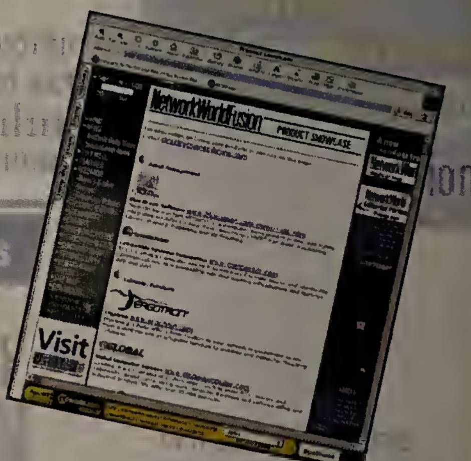

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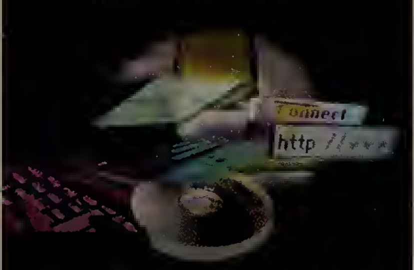

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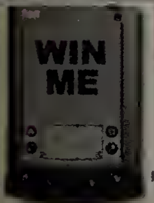

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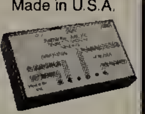

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System Administrator: responsible for company's LAN & Computer Systems; install, configure, maintain, Network devices, Protocols, Novell Servers, Microsoft Servers, and upgrade Compaq Server Hardware. Must have Master Degree in Computer Science with at least two years experience. Please fax resume to Mr. Martin Yang at (732) 225-7033 or send to Officemate International Corp., 90 Newfield Avenue, Edison, NJ 08837.

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Telecom Systems S/ware Engineers (Multiple openings) sought by Hi-tech Telecom Dvlpr in Princeton, NJ. Must have Bach in Comp. Sci. EE., Electronics or Comm. Engg. & 2 yrs. exp. Please respond to: Attn: Kondo/CCRL, NEC USA d/b/a Eulix, 4 Independence Way, Princeton, NJ 08540.

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Business Analysts: Positions available in our New York, New York City, Chicago, San Jose, San Francisco and Nashville area offices. Will work as team leaders with exceptional teams of computer and business professionals participating in full life-cycle development of distributed, object-oriented applications. Will apply OO analysis and design methodologies and object modeling techniques to design OO applications. Will be responsible for working with users to define system requirements. Will translate those requirements into clear and precise specifications for the developers to implements. Will design screens, write use cases, design and perform system testing. Requirements: Master's degree in Business, Computer Information Systems or related field, or Foreign equivalent. If interested, please email your resume and cover letter to jobs@thoughtworks.com.

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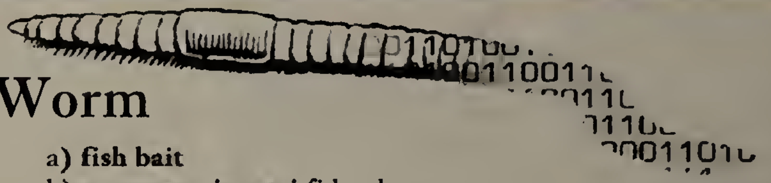

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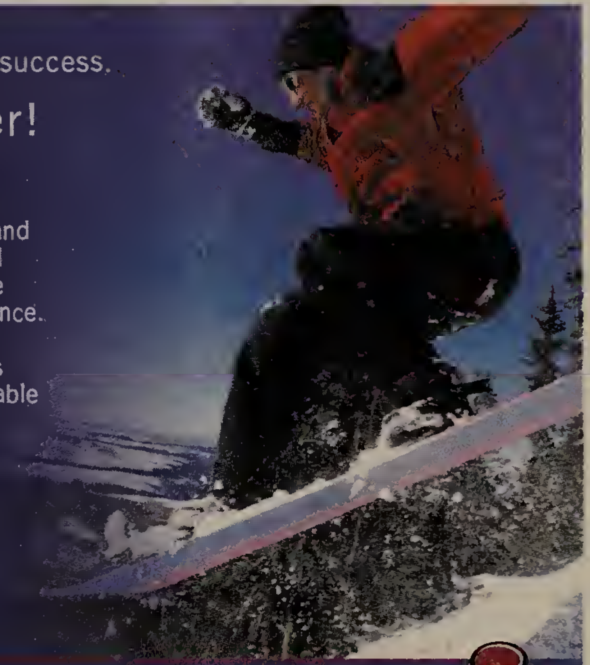

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EDITORIAL INDEX

3Com 8,22,42,56
A
Akamai Technologies . .28,38,51
Alcatel 8,23,44,56
Ameritech 18,48,66
AOL .8,47
Apple 28,48
Ariba 8,11,47
ArrowPoint 8,11
AT&T 7,11,16,23,25,37,46,56
B
Bell Atlantic 9,47,57,66
BellSouth 18,22,56,63
Brocade 44,77
C
Cabletron 8,23,57
Cerent 50,54
Cisco 7,11,22,38,56,67,77
Compaq 11,23,57
Computer Associates23,40,56,69
CoreTek 12,40,50
Covad Communications 7,63
D
Dell 11,22,38,56,75,77
E
EMC .11,40
Exodus Communications 9,28,37
F
Foundry Networks 42
G
GTE 9,38,57
H
Hewlett-Packard .14,23,28,38,57
I
i2 Technologies 8,11,47
IBM . . .8,11,23,34,38,57,75,77,85
Intel 9,11,23,40,57
Intermedia Communications .47
IP Communications 66
J
Juniper Networks 7,14,38,54
L
Linux 76
Lotus 48,85
Lucent 7,11,22,37,50,56,77,85
M
McData 11,77
Media One 8,48
Microsoft .7,11,22,25,38,56,59,71
MindCrossing 34
Motorola 14
N
Netscape 25,46,85
Network Appliance 9,44
Network Associates . . .23,44,57
Newbridge Networks . . .8,44,57
Nishan Systems 77
Nokia 14
Nortel Networks . .8,23,40,56,67
NorthPoint Communications . .9
Novell . .8,11,22,37,48,56,71,75,85
NTT DoCoMo 14
O
Oracle 8,11,22,38,56,75,85
P
Pacific Bell 18,48,66
Palm .9,37
Q
Qlogic 77
Qtera 50
Quantum 77
Qwest 8,50,57,66
R
RealNetworks 28
Red Hat 75
Research In Motion 14,42
RiverSoft 69
S
SANgate 77
Santera Systems 48
SAP 9,23,47,56
SBC . . .8,11,16,22,48,57,59,63,65
Siemens 77
Southwestern Bell 66
Speedera Networks 28
Sprint 7,8,14,23,25,46,57
Sun 8,11,23,34,38,57,59,77,79
Sybase .47
Sycamore Networks 50
Symantec 9
T
TeraBeam Networks 8
Tivoli Systems 11,28,69
U
US West 8,50
V
VA Linux 76
VeriSign .8
Verizon 8,11,23,47,57,63
W
WorldCom . . .7,11,23,25,37,46,56
X
Xros 12,40,50
Y
Yipes Communications 46

ADVERTISER INDEX

Advertiser	Page #	URL
3Com Corp	4	www.3com.com
ACI International	94	www.aciconnect.com
Adtran	30	www.adtran.com
Agilent Technologies	33	www.agilent.com
Amco Engineering	95	www.amcoengineeering.com
Aprisma	55	www.aprisma.com
Avocent	87	www.avocent.com
Bay Technical Associates	96	www.baytech.net
Belden Wire & Cable	16	www.integrityscs.com
Bell South	70	www.bellsouth.com
Black Box Corp	64	www.blackbox.com
Brocade Communications	76	www.brocade.com
BuyUptime.com	95	www.buyuptime.com
CacheFlow Inc	39	www.cacheflow.com
Captus Networks	18	www.captusnetworks.com
Check Point Software	49	www.checkpoint.com
Computer Associates	104	www.ca.com
E-Comms Inc	92	www.e-comms.com
Ecrix Corp	68	www.ecrix.com
Extreme Networks	19	www.extremenetworks.com
Fluke Corp	41	www.flukenetworks.com
Foundry Networks	27	www.foundrynetworks.com
Global Technology Associates	92	www.gnatbox.com
Golden Gate University	90	www.ggu.edu
IBM	2-3, 15	www.ibm.com
IXIA	17	www.ixiacom.com
Net To Net Technologies	89	www.nettonettech.com
Network Elements	88	www.nei.com
Network Instruments	90	www.networkinstruments.com
Network Technologies	90	www.nti1.com
Platform Computing	35	www.siteassure.com
Powerware Corp	43	www.powerware.com
Pulizzi Engineering	93	www.pulizzi.com
Quick Eagle	72	www.quickeagle.com
Rackit Technology Co	88	www.RackitTechnology.com
Radware	21	www.radware.com
Raritan	93	www.raritan.com
Recourse Technologies	66	www.recourse.com
Red Creek Communications	60	www.redcreek.com
Rose Electronics	94	www.rosel.com
SAP	45	www.mySAP.com
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Siemens Information	36	www.icn.siemens.com
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Top Layer Networks	37	www.TopLayer.com
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VBrick Systems Inc	91	www.vbrick.com
Vixel Corp	62	www.vixel.com
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INTEGRATED— All *e*Trust solutions are designed and built to work together seamlessly.

EASY — *e*Trust solutions are easy to use, deploy, and administer, ensuring any environment is secured quickly and correctly.

MISSION-CRITICAL — *e*Trust solutions offer the scalability, depth, and robustness fast-growing and successful eBusinesses need.

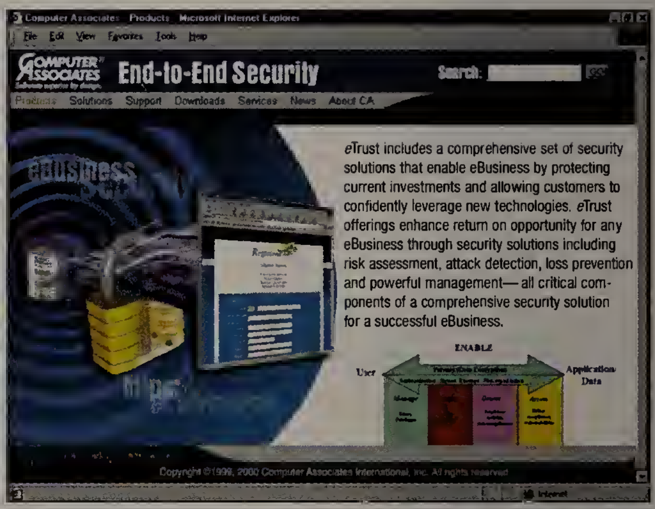
*e*Trust Security Suite

- Access Control
- Administration
- Single Sign-On
- Firewall
- Content Inspection
- Intrusion Detection
- Policy Compliance
- Audit
- Virtual Private Network
- Encryption
- Directory
- OCSPro
- Anti-Virus

*e*Trust Is Open And Extensible

*e*Trust allows you to leverage existing investments in security solutions — you will never have to start over or convert anything. And *e*Trust can be implemented one function at a time or all at once — it's your choice.

And since *e*Trust is built on the Unicenter TNG® Framework,™ it lets you snap-in other eBusiness management solutions as you grow and your needs change. *e*Trust is built on a standards-based, open infrastructure, so it's always easy to plug in any other standards-compliant products or solutions.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*e*Trust includes a comprehensive set of security solutions that enable eBusiness by protecting current investments and allowing customers to confidently leverage new technologies. *e*Trust offerings enhance return on opportunity for any eBusiness through security solutions including risk assessment, attack detection, loss prevention and powerful management— all critical components of a comprehensive security solution for a successful eBusiness.

*e*Trust Is Trustworthy

*e*Trust is not only backed by the world's leading security software company,* it is also complemented by a complete set of outcome-based service offerings. CA Services™ stands ready to make sure your implementation is fast and trouble-free.

If your company is making the difficult transition to an eBusiness, you owe it to yourself to find out more about the security solution more eBusinesses trust.

For more information, call 1-800-377-5327, or visit www.ca.com/solutions/enterprise/etrust/

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*According to "Internet Security Software: 1999 Worldwide Markets & Trends," by IDC.